

**ARMS CONTROL NONPROLIFERATION  
AND DISARMAMENT STUDIES**

**ANNUAL REPORT TO CONGRESS  
1998**

**U.S. ARMS CONTROL AND DISARMAMENT  
AGENCY**

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## **ARMS CONTROL AND DISARMAMENT AGENCY**

### **Arms Control**

#### **ACDA Annual Report**

[http://WWW.ACDA.GOV/reports/annual/anrpt\\_97.htm](http://WWW.ACDA.GOV/reports/annual/anrpt_97.htm)

Abstract: The President's plan ensures that arms control and nonproliferation will be at the heart of American foreign policy, and enhances our nation's ability to meet the growing foreign policy challenges of the 21st century.

#### **Adherence to and Compliance with Arms Control Agreements**

<http://WWW.ACDA.GOV/reports/annual/comp97.htm>

Abstract: This Report addresses U.S. compliance, compliance by Russia and other successor states to the former Soviet Union (FSU) to treaties and agreements concluded bilaterally with the Soviet Union, and compliance by other countries that are parties to multilateral agreements with the United States.

#### **Report to Congress on Arms Control, Nonproliferation and Disarmament Studies**

<http://WWW.ACDA.GOV/reports/rptacnp.htm>

Abstract: This document has been compiled to enhance Congressional and public understanding of the importance of arms control issues that the U.S. Government is addressing in a research capacity.

### **Chemical and Biological Warfare**

#### **Australia Group Meeting, Paris, Oct. 9-15, 1998**

<http://WWW.ACDA.GOV/factshee/wmd/cw/austra.htm>

Abstract: Australia Group participants held informal consultations in Paris from 9 to 15 October 1998 on chemical and biological weapons (CBW) proliferation.

#### **The Chemical Weapons Convention**

<http://WWW.ACDA.GOV/factshee/wmd/cw/cwcfcs.htm>

Abstract: The Chemical Weapons Convention is a global treaty that bans an entire class of weapons of mass destruction, chemical weapons. The CWC bans the production, acquisition, stockpiling, transfer and use of chemical weapons. It entered into force April 29, 1997.

## **Chemical Weapons Convention: A Balance Between Obligations and the Needs of States Parties**

<http://WWW.ACDA.GOV/factshee/wmd/cw/cwbal.htm>

Abstract: This paper describes some of the CWC's key provisions, which were designed to balance the need for effective Convention provisions with the national security and economic requirements of States Parties in implementing such provisions.

## **Chemical Weapons Convention Implementation Act of 1998**

<http://WWW.ACDA.GOV/factshee/wmd/cw/legis1.htm>

Abstract: The President is authorized to implement and carry out the provisions of this Act and the Convention and shall designate through Executive order which agencies of the United States shall issue, amend, or revise the regulations in order to implement this Act and the provisions of the Convention. The Director of the United States National Authority shall report to the Congress on the regulations that have been issued, implemented, or revised pursuant to this section.

## **Chemical Weapons Convention Signatories/Ratifiers**

<http://WWW.ACDA.GOV/factshee/wmd/cw/cwcsig.htm>

Abstract: Signed by 130 countries in Paris on Jan. 12, 1993, the CWC entered into force on April 29, 1997. As of May 24, 1999, 169 countries have signed the CWC, of which 125 have ratified it.

## **Guidelines for Schedules of Chemicals**

<http://WWW.ACDA.GOV/factshee/wmd/cw/cwcsched.htm>

Abstract: The following Schedules list toxic chemicals and their precursors. For the purpose of implementing this Convention, these Schedules identify chemicals for the application of verification measures according to the provision of the Verification Annex.

## **Organization for the Prohibition of Chemical Weapons**

<http://WWW.ACDA.GOV/factshee/wmd/cw/orgcwc.htm>

Abstract: The Organization for the Prohibition of Chemical Weapons (OPCW) in The Hague, the Netherlands, is responsible for implementing the Chemical Weapons Convention (CWC). The OPCW structure and functions are described.

## **Parties and Signatories of the Biological Weapons Convention**

<http://WWW.ACDA.GOV/treaties/bwcsig.htm>

Abstract: The Biological Weapons Convention requires Parties not to develop, produce, stock-pile, or acquire biological agents or toxins "of types and in quantities that have no justification for prophylactic, protective, and other peaceful purposes," as well as weapons and means of delivery. The United States unilaterally renounced biological and toxin weapons in 1969.

## **U.S. - Russian Wyoming Memorandum of Understanding on Chemical Weapons**

<http://WWW.ACDA.GOV/factshee/wmd/cw/cwmou.htm>

Abstract: This agreement was proposed by the United States and has been a goal of U.S. policy since 1984. It reflects an effort by the United States and the Russian Federation to facilitate the process of negotiation, ratification and implementation of the Chemical Weapons Convention, a comprehensive, effectively verifiable and truly global ban on chemical weapons.

## **Conventional Arms Control**

### **Organization of American States Conference on Confidence-and Security-Building Measures (CSBMS)**

<http://WWW.ACDA.GOV/factshee/secbldg/oas.htm>

Abstract: The Conference and its Final Declaration demonstrated continued momentum in the hemisphere for arms control, in particular CSBMs, as a component of a national security strategy. On a bilateral and multilateral basis the 27 participating countries were able to identify for possible implementation additional CSBMs that complement the 1995 Santiago Declaration.

### **Possible Organization of American States (OAS) Convention on Transparency in Arms Acquisition**

<http://WWW.ACDA.GOV/factshee/secbldg/orgoas.htm>

Abstract: In order to initiate a process for discussing the OAS General Assembly mandate for greater transparency on weapons procurement in the hemisphere, the United States and Brazil presented a joint proposal to other OAS member states on a convention for transparency in arms acquisitions. On October 6, 1998, the OAS Committee on Hemispheric Security voted unanimously to establish a formal working group to negotiate the language of this convention. The establishment of this working group brings to fruition two years of intense consultations by ACDA, the State Department and Brazil to implement a concrete Confidence and Security Building Measure (CSBM) in the region.

## **Small Arms Issues: U.S. Policy and Views**

<http://WWW.ACDA.GOV/factshee/conwpn/small.htm>

Abstract: U.S. policy and views on small arms issues are generally framed by the President's February 1995 Conventional Arms Transfer Policy. According to that policy, the United States is currently undertaking, leading, or otherwise supporting a wide range of national, international, and regional efforts to address many complex aspects of small arms proliferation and control. This fact sheet highlights the relevant elements of U.S. conventional arms transfer policy, and summarizes U.S. views and actions in four broad areas relating to small arms: national export controls, combating illegal arms trafficking, multilateral efforts, and regional arms control initiatives.

### **World Military Expenditures and Arms Transfers 1997**

<http://WWW.ACDA.GOV/wmeat97/wmeat97.htm>

Abstract: WMEAT (pronounced "we-meet") is issued by ACDA annually to serve as a convenient reference on military expenditures, arms transfers, armed forces and related economic data for hundreds of countries over the past decade.

### **Nuclear Proliferation**

#### **African Nuclear-Weapon-Free Zone Treaty (The Treaty of Pelindaba): Dates of Signature, Ratification and Deposit**

<http://WWW.ACDA.GOV/treaties/afnwsigs.htm>

Abstract: The African Nuclear Weapon Free Zone Treaty, also known as the Treaty of Pelindaba, establishes a nuclear weapon free zone in Africa. Signature of the Treaty culminates a 32-year quest for a nuclear free Africa, beginning when the Organization of African Unity formally stated its desire for a Treaty ensuring the denuclearization of Africa at its first Summit in Cairo in July 1964.

### **U.S. Commitment to the Treaty on the Non-Proliferation of Nuclear Weapons**

<http://WWW.ACDA.GOV/factshee/wmd/nuclear/npt/commnpt.htm>

Abstract: The United States is strongly committed to the NPT, to efforts that further strengthen the Treaty, and to the broader international nonproliferation and arms control regime. The United States has taken numerous practical steps -- unilateral, bilateral, and multilateral -- to affirm this commitment and to underscore the fact that a permanent NPT is a positive force for international efforts to promote progress in arms control, nonproliferation, and disarmament. Many of these steps have been taken since the conclusion of the 1995 NPT Conference.

### **Nuclear Testing**

## **Comprehensive Nuclear Test-Ban Treaty Signatories/Ratifiers**

<http://WWW.ACDA.GOV/factshee/wmd/nuclear/ctbt/ctbtsigs.htm>

Abstract: The Comprehensive Test Ban Treaty (CTBT) was opened for signature on September 24, 1996. As of May 26, 1999, 152 nations have signed, including all five nuclear-weapon states, and 36, including France and the United Kingdom, have deposited their instruments of ratification. The Treaty names 44 states that must deposit their instruments of ratification for it to enter into force. Of these, 18 have now ratified.

## **Strategic Arms Control**

### **Freedom-to-Mix**

Web site not available

Abstract: An ACDA point paper by Robert T. Batchner and James Scouras of the Office of Intelligence, Technology and Analysis exploring the concept for integrating offensive and defensive strategic arms control. This paper presents issues related to “freedom-to-mix,” a concept to integrate strategic offensive and defensive arms control in a single treaty between the United States and Russia. It is intended to facilitate discussion of this concept by exploring its potential advantages, disadvantages, and negotiability, and should not be construed to advocate the institution of such a treaty.

### **Post-Cold War Nuclear Scenarios**

Web site not available

Abstract: An ACDA briefing developed by James Scouras of the Office of Intelligence, Technology and Analysis involving Post-Cold War Nuclear Scenarios and their implications of a new strategic calculus. How should we evaluate the contribution of strategic forces to US national security in the Post-Cold War era? Are nuclear weapons still relevant? Is nuclear deterrence still relevant and how should it be evaluated? Is first-strike stability still relevant and how should it be evaluated? The briefing is intended to facilitate discussion of this concept by exploring its potential advantages, disadvantages, and negotiability, and should not be construed to advocate the institution of such policy.

## **Standing Consultative Commission and Joint Statement on the Fifth ABM Treaty Review**

<http://WWW.ACDA.GOV/factshee/missdef/fifth.htm#1>

Abstract: The Standing Consultative Commission (SCC), established under the 1972 ABM Treaty to promote the objectives and implementation of the provisions of the Treaty, concluded a session that began here on September 9. During the session, representatives of the United States, Belarus,

Kazakstan, Russia, and Ukraine completed work on procedures for implementing the September 1997 Agreement on Confidence-Building Measures (CBMA), and conducted the fifth periodic review of the ABM Treaty.

### **Strategic Stability under the START III Treaty**

Web site not available

Abstract: An ACDA briefing developed by James Scouras of the Office of Intelligence, Technology and Analysis involving strategic stability as envisioned under the proposed START III Treaty. It is intended to facilitate discussion of this concept by exploring its potential advantages, disadvantages, and negotiability, and should not be construed to advocate the institution of such a treaty.

### **Uncertainty in Ballistic Missile Defense Performance**

Web site not available

Abstract: An ACDA point paper by Robert T. Batcher and James Scouras of the Office of Intelligence, Technology and Analysis exploring the thesis that defense measures and countermeasures increase the level of uncertainty in the outcome of strategic nuclear war. The performance of enemy and even friendly defenses will be a major source of such uncertainty impacting the design, deployment, and targeting of both offensive and defensive forces. Although uncertainty may enhance deterrence by instilling doubt in a risk-adverse planner, it can have the opposite effect if the planner is risk-tolerant, discounts the capabilities of the defenses, or is backed into a corner.

## **DEPARTMENT OF DEFENSE DEFENSE LINK**

### **U.S. Military Strategy and Technology**

#### **Allied Contributions to the Common Defense**

[http://WWW.defenselink.mil/pubs/allied\\_contrib98/allied98\\_1.html#intro](http://WWW.defenselink.mil/pubs/allied_contrib98/allied98_1.html#intro)

Abstract: This Report presents the Department of Defense assessment of the relative contributions toward common defense and mutual security made by our NATO allies, our key partners in the Pacific (Japan and the Republic of Korea), and the countries of the Gulf Cooperation Council (GCC).

#### **Annual Report to the President and the Congress by the Secretary of Defense**

[http://www.dtic.mil/execsec/adr\\_intro.html](http://www.dtic.mil/execsec/adr_intro.html)



Abstract: Having inherited the defense structure that won the Cold War and Desert Storm, the Clinton Administration intends to leave as its legacy a defense strategy, a military, and a Defense Department that have been transformed to meet the new challenges of a new century. Our strategy will ensure that America continues to lead a world of accelerating change by shaping the emerging security environment to reduce threats and to promote our interests and by responding to crises that threaten our interests. We will execute the strategy with superior military forces that fully exploit advances in technology by employing new operational concepts and organizational structures. And we will support our forces with a Department that is as lean, agile, and focused as our war fighters.

### **Cooperative Threat Reduction Handbook**

<http://www.ctr.osd.mil/>

Abstract: The CTR Program seizes an unprecedented opportunity to reduce threat. The threat is clear. Despite the success of U.S. and allied efforts, today there remain 6,700 nuclear warheads; 1,200 operational missiles designed to deliver them; the potential for proliferation of nuclear weapons material from an under paid and vast nuclear weapons complex; 40,000 metric tons of declared chemical weapons and agents; and a production base for nuclear, chemical, and biological weapons as well as their associated delivery systems on the territories of former Soviet states. Regardless of the political inclination of these states, these residual capabilities represent potential dangers to the United States, our Allies, and these new nations themselves.

### **DOD Plan for Integrating National Guard and Reserve Component Support Response to Attacks Using Weapons of Mass Destruction**

<http://WWW.defenselink.mil/pubs/wmdresponse/>

Abstract: The proliferation of weapons of mass destruction presents the greatest threat that the world has ever known. More and more countries are acquiring technology ? not only missile technology ? and are developing chemical weapons and biological weapons capabilities to be used in theater and also on a long range basis.

### **Domestic Preparedness Program in the Defense Against Weapons of Mass Destruction**

<http://WWW.defenselink.mil/pubs/domestic/toc.html>

Abstract: This report summarizes the Department of Defense (DOD) actions to submit a report to Congress on four specific issues: assess the types and characteristics of chemical and biological threats; identify unmet training, equipment and other requirements for first responders; identify chemical/biological warfare information, expertise and equipment that could be adapted to civilian application; and present a detailed plan for DOD assistance in equipping, training and providing other necessary assistance for first responders to such incidents.

## **Joint Chiefs of Staff Posture Statement**

<http://www.dtic.mil/jcs/core/Posture99.html>

Abstract: "It is an honor to report to the Congress today on the state of the United States Armed Forces. At the outset, I would like to pay tribute to our men and women in uniform. As always, they serve our country selflessly, often far from home and loved ones, defending our Nation and its interests and helping to keep the peace in a still dangerous world. America can and should be proud of its soldiers, sailors, airmen, and marines. They represent the United States at its very best.

## **National Defense Panel Final Report - "Transforming Defense: National Security in the 21st Century"**

<http://www.dtic.mil/ndp/>

Abstract: "...our intention is to stimulate a wider debate on our defense priorities and the need for a transformation to meet the challenges of 2020. Such a debate will be critical in building the necessary support of the Congress and American people for the extensive changes that must be made."

## **National Military Strategy: Shape, Respond, Prepare Now -- A Military Strategy for a New Era**

<http://www.dtic.mil/jcs/core/nms.html>

Abstract: The National Military Strategy provides the advice of the Chairman of the Joint Chiefs of Staff (CJCS) in consultation with the Joint Chiefs of Staff and the Combatant Commanders on the strategic direction of the Armed Forces over the next three to five years. In formulating the 1997 National Military Strategy, the CJCS derives guidance from the President's 1997 National Security Strategy and from the Quadrennial Defense Review (QDR) report prepared by the Secretary of Defense.

## **National Security Strategy Report**

<http://www.whitehouse.gov/WH/EOP/NSC/html/documents/nssrpref.html>

Abstract: As we approach the beginning of the 21st century, the United States remains the world's most powerful force for peace, prosperity and the universal values of democracy and freedom. Our nation's challenge and our responsibility is to sustain that role by harnessing the forces of global integration for the benefit of our own people and people around the world.

These forces of integration offer us an unprecedented opportunity to build new bonds among individuals and nations, to tap the world's vast human potential in support of shared aspirations, and to create a brighter future for our children. But they also present new, complex challenges. The

same forces that bring us closer increase our interdependence, and make us more vulnerable to forces like extreme nationalism, terrorism, crime, environmental damage and the complex flows of trade and investment that know no borders.

### **Nuclear Weapon Systems Sustainment Programs**

<http://WWW.defenselink.mil/pubs/dswa/>

Abstract: This report summarizes the activities that develop and maintain the core competencies, technical and operational, needed for accomplishment of the Defense Department's nuclear missions. It responds to issues regarding the Defense Department's core nuclear competencies raised in recent Senate Armed Services Committee and House National Security Committee reports.

### **Proliferation: Threat and Response**

<http://WWW.defenselink.mil/pubs/prolif97/>

Abstract: The May 1997 Report of the Quadrennial Defense Review (QDR) concluded that the threat or use of nuclear, biological, or chemical (NBC) weapons is a likely condition of future warfare and could occur in the early stages of war to disrupt U.S. operations and logistics. These weapons may be delivered by ballistic missiles, cruise missiles, aircraft, special operations forces, or other means. In many of the world's regions where the United States is likely to deploy forces including Northeast Asia and the Middle East potential adversaries have chemical and/or biological weapons and the missile systems to deliver them, and actively seek nuclear weapons. Potential adversaries may seek to counter American conventional military superiority using less expensive and more attainable, asymmetrical means, including NBC weapons. To meet this challenge, as well as the possibility that NBC weapons might also be used in some smaller-scale contingencies, U.S. forces must be properly trained and equipped to operate effectively and decisively in the face of NBC attacks. The first section of this report details the proliferation of NBC weapons and the threat it poses to U.S. interests and forces.

### **Quadrennial Defense Review Report**

<http://WWW.defenselink.mil/pubs/>

Abstract: The QDR is required by the Military Force Structure Review Act, which was included as part of the National Defense Authorization Act for Fiscal Year 1997. The Department of Defense designed the QDR to be a fundamental and comprehensive examination of America's defense needs from 1997 to 2015: potential threats, strategy, force structure, readiness posture, military modernization programs, defense infrastructure, and other elements of the defense program. The QDR is intended to provide a blueprint for a strategy-based, balanced, and affordable defense program.

## **U.S. Security Strategy for Europe and NATO**

<http://WWW.defenselink.mil/pubs/security/>

Abstract: President Clinton has declared U.S. support for expanding the zone of stability through his vision of ?a free and undivided Europe and ?an integrated democratic Europe cooperating with the United States to keep the peace and promote prosperity. We must seek to realize this vision by maintaining a strong NATO Alliance, while avoiding the creation of new dividing lines that could exacerbate security threats in Europe.

## **The United States Security Strategy for the East Asia-Pacific Region 1998**

<http://WWW.defenselink.mil/pubs/easr98/>

Abstract: This report itself represents an important exercise transparency. The 1998 East Asia Strategy Report has outlined U.S. perspectives, relationships, interests and strategy toward the Asia-Pacific region as the specter of the Cold War recedes and we move into the 21st century. The region will face many challenges in coming years; some we will anticipate, others we will not. The vision outlined in this section and throughout this report should make clear that the United States is prepared to join with the other nations of the Asia-Pacific region to address the challenges of a changing world and will remain steadfast in its commitment to comprehensive engagement in the region into the new century.

### **DEPARTMENT OF DEFENSE DEFENSE TECHNICAL INFORMATION CENTER**

#### **Chemical and Biological**

#### **Accelerated Solvent Extraction of Soil Samples for the Determination of the Presence of Chemical Warfare Breakdown Products**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=TR\\_U2&search.DOC.TEXT=&search.ADNUMBER.TEXT=ADA342564&search.TITLE.TEXT=&search.PERS\\_AUT.TEXT=&search.CORP\\_AUT.TEXT=&search.SRC\\_CODE.TEXT=&search.DESCRPT.TEXT=&search.REP\\_DATE.GTEDATE=&search.REP\\_DATE.LTEDATE=&search.ABSTRACT.TEXT=&search.FLD\\_GROUPS.TEXT=&search.CONT\\_NUMBER.TEXT=&search.DESC\\_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=25&fuzzy=0](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC.TEXT=&search.ADNUMBER.TEXT=ADA342564&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRPT.TEXT=&search.REP_DATE.GTEDATE=&search.REP_DATE.LTEDATE=&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=25&fuzzy=0)

Abstract: Allegations concerning the use and/or manufacture of chemical warfare (CW) agents in recent years has been of interest to many countries. The presence of CW agents, precursors, and decomposition breakdown) products in the environment has been studied by various collection and extraction means. This report details the work performed in the extraction of CW breakdown products from three types of standard soils, using the Dionex ASE 200 Accelerated Solvent Extractor and the Zymark TurboVap LV Evaporation System.

## **Air Force Operations in a Chemical and Biological Environment**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA341140&searchterms=%28ADNUMBER%20CONTAINS%20%27ADA341140%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ADA341140%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=92999602027934](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA341140&searchterms=%28ADNUMBER%20CONTAINS%20%27ADA341140%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ADA341140%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=92999602027934)

Abstract: This study examines how adversaries might use chemical and biological weapons (CBWs) to paralyze U.S. Air Force operations, how the Air Force might continue operations despite a contaminated environment, and how additional measures might enable the Air Force to sustain operations. The work should be of interest to policy makers and military planners in countering CBWs. This study was sponsored by the Air Staff office formerly known as the Air Force Director of Plans (AF/XOX), part of whose functions have since been assumed by the Air Force Deputy Chief of Staff, Air and Space Operations (AF/XO), and part by the Air Force Deputy Chief of Staff, Plans and Programs (AF/XP). The study was conducted at RAND under the Strategy and Doctrine Program within Project Air Force.

## **Biological Effects of Non-Lethal Weapons: Issues and Solutions**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA351449&searchterms=%28ADNUMBER%20CONTAINS%20%27ADA351449%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ADA351449%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=92999632329941](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA351449&searchterms=%28ADNUMBER%20CONTAINS%20%27ADA351449%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ADA351449%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=92999632329941)

Abstract: Military peace keeping, humanitarian efforts, and missions other-than-war have become increasingly common. In such operations, many dangers exist to the troops, yet the use of lethal force is often not justified or acceptable. This conference is concerned with new non-lethal options for applying military force. This new requirement has been addressed by the United States Department of Defense in a policy statement for Non-Lethal Weapons (NLWs), in which such weapons are defined as weapon systems explicitly designed to incapacitate personnel or materiel while minimizing fatalities, permanent injury, and undesired damage to property and the environment (DOD Policy Directive 3000.3). The development and fielding of new weapons that fit this definition will require much work using many approaches.

## **Biological Warfare Agent as Potable Water Threats**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA342052&searchterms=%28ADNUMBER%20CONTAINS%20%27ADA342052%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ADA342052%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9299971085053](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA342052&searchterms=%28ADNUMBER%20CONTAINS%20%27ADA342052%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ADA342052%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9299971085053)

Abstract: This information paper discusses the consequences of incidental or intentional

contamination of potable water supplies by biological warfare (BW) agents. It is intended for the use of combat/materiel developers as well as preventive medicine and water production personnel.

### **Biological Warfare Defense: Should the Operational Commander Worry?**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA351691&searchterms=%28ADNUMBER%20CONTAINS%20%27ada351691%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada351691%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023090414353](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA351691&searchterms=%28ADNUMBER%20CONTAINS%20%27ada351691%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada351691%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023090414353)

Abstract: The Gulf War experience showed our lack of preparedness regarding biological warfare defense. Although we have made remarkable progress since that time, significant deficiencies still remain. Biological agents have a number of characteristics that make them a unique weapon category and at the same time pose tremendous difficulties for defense. Two of our most serious deficiencies are medical defense and detection. Over the last few years, our research and development efforts have made progress in vaccines and fielded several promising demonstration detection systems. However, we currently vaccinate our force against only one biological agent. Also, our current detection equipment can only detect biological attacks that are in progress and in the immediate area. Furthermore, our strategic mobility is vulnerable due both to the large involvement of the civilian commercial sector and to problems in defense of large areas such as ports and airfields. Operational commanders and planners must understand and make allowances for the realities of our current deficiencies in biological defense, and also must assist in raising the level of biological defense funding, education and training.

### **Biological Weapons: Implications for the Operational Commander**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA348563&searchterms=%28ADNUMBER%20CONTAINS%20%27ada348563%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada348563%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9302341126955](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA348563&searchterms=%28ADNUMBER%20CONTAINS%20%27ada348563%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada348563%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9302341126955)

Abstract: Biological Weapons (BW) are a growing threat in an age of asymmetrical warfare. More than other Weapons of Mass Destruction (WMD), however, biological weapons are quite likely to be used in a future conflict. With their potential for devastating casualties and their ability to be dispensed surreptitiously, they are a very attractive weapon for an opposing commander to counter U.S. conventional superiority. Due to the plausible deniability of their use, their wide variety of distribution methods, and the lack of actionable intelligence available to the operational commander, BW are not susceptible to the standard strategies of non- and

counter-proliferation. Thus, operational commanders must realistically plan and prepare to fight and win in a biological warfare environment.

### **Biological Weapons in Major Theater War**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA362102&searchterms=%28ADNUMBER%20CONTAINS%20%27ada362102%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada362102%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9302343478680](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA362102&searchterms=%28ADNUMBER%20CONTAINS%20%27ada362102%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada362102%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9302343478680)

Abstract: Widespread recognition of the biological weapons threat in regions of security concern to the United States has generated a broad range of activities to improve the ability of U.S. forces to fight and survive in a BW environment. Yet the BW problem remains poorly understood among military planners and operators, as do the full spectrum of requirements associated with successfully defeating a well-armed BW aggressor. The BW threat is typically seen as having relatively low priority, compared with conventional, chemical, and nuclear threats, when in fact BW programs are proliferating and biological weapons are located in every region where major theater war is a possibility. The use of BW in the offensive is typically seen as "another version of getting slimed, only worse," when in fact the modes and effects of BW use are likely to be distinctive. BW defense is typically seen as comprising CW protection plus vaccination, when in fact a defense in depth consisting of active and passive defenses, counter force capabilities, medical countermeasures, and other elements is necessary.

### **Chemical and Biological Defense; Observations on DOD's Plans to Protect U.S. Forces**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA342068&searchterms=%28ADNUMBER%20CONTAINS%20%27ada342068%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada342068%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023459010422](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA342068&searchterms=%28ADNUMBER%20CONTAINS%20%27ada342068%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada342068%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023459010422)

Abstract: In examining DOD'S experience in preparing its forces to defend against potential chemical and biological agent attacks during the Gulf War, we identified numerous problems. Specifically, we found shortages in individual protective equipment, inadequate chemical and biological agent detection devices, inadequate command emphasis on chemical and biological capabilities, and deficiencies in medical personnel training and supplies. While many deficiencies noted during the Gulf War remain unaddressed today, DOD has increasingly acknowledged and accepted the urgency of developing a capability to deal with the chemical and biological threat to its forces. Both the Congress and DOD have acted to provide greater protection for U.S. forces. Their actions have resulted in increased funding, and the fielding of more and better chemical and biological defense equipment. DOD must address remaining critical deficiencies if U.S. forces are



to be provided with the resources necessary to better protect themselves. For example, DOD needs to decide on major policy and doctrine issues, improve and increase its capability to detect toxic agents, provide forces with improved and sufficient numbers of individual protective equipment, and deal with problems of collective protection and decontamination.

### **Chemical and Biological Modeling Process Action Team**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA337581&searchterms=%28ADNUMBER%20CONTAINS%20%27ada337581%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada337581%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023497113143](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA337581&searchterms=%28ADNUMBER%20CONTAINS%20%27ada337581%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada337581%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023497113143)

Abstract: A Process Action Team (PAT) for Chemical and Biological Modeling, jointly sponsored by the Office of the Assistant to the Secretary of Defense for Atomic Energy, Chemical and Biological Matters, and the Under Secretary of Defense for Operations Research, was completed to evaluate current modeling efforts and provide a consolidated and integrated Chemical and Biological (CB) Modeling program, where possible harmonizing individual service and agency work into joint programs and eliminating duplication and overlapping projects. The PAT recommended establishing a Modeling and Simulation (M&S) Commodity Area under the Joint NBC Defense Board (JNBCDB), which would include all organizations involved in NBC Modeling and Simulation, including the services, DOD agencies, and national laboratories. This commodity area would serve to establish a consolidated, integrated, and coordinated CB M&S program.

### **Chemical Demilitarization Incinerator Post-Treatment Filter Modeling Fundamentals**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA342596&searchterms=%28ADNUMBER%20CONTAINS%20%27ada342596%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada342596%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023514613959](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA342596&searchterms=%28ADNUMBER%20CONTAINS%20%27ada342596%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada342596%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023514613959)

Abstract: The fundamental basis for the Post-Treatment Filter model is presented. The most significant challenge concerned estimating adsorption equilibria. Problems addressed include: (1) predicting adsorbent capacity for numerous chemicals for which data is sparse, and (2) predicting adsorbent capacity for vapors at extremely low concentrations. Two potential-theory based predictive methods were developed. One allows estimation of adsorption equilibria using only liquid molar volumes and critical temperatures of adsorbates while the other requires only critical temperature data. The reliability of the methods was assessed using Person product correlation coefficients and standard deviations of the percent errors between predicted values and



experimental values. A discussion of Henry's law in relation to the potential theory is included. Multi component equilibria is estimated from pure-component isotherms. The dynamic model differential material and energy balances are also discussed as well as the approach taken to estimate the extent of dispersion due to finite mass transfer rates and hydrodynamic disturbances due to filter packing.

### **Counter Proliferation**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA337263&searchterms=%28ADNUMBER%20CONTAINS%20%27ada337263%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada337263%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023597319925](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA337263&searchterms=%28ADNUMBER%20CONTAINS%20%27ada337263%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada337263%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023597319925)

Abstract: This JASON report has been prepared in response to a request from the Defense Counterproliferation initiative to comment on key areas of their program and to suggest the application of new technologies to key problems in the area of counterproliferation.

### **The DTIC Review: Bioterrorism: A Grim Reality, Volume 4, Number 3, January 1999**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA358723&searchterms=%28ADNUMBER%20CONTAINS%20%27ada358723%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada358723%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93031826214477](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA358723&searchterms=%28ADNUMBER%20CONTAINS%20%27ada358723%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada358723%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93031826214477)

Abstract: Biological warfare is the use of disease to harm or kill an adversary's military forces, population, food, and livestock. This includes any living (or non-living virus) microorganism or bioactive substance that is produced by a microorganism that can be delivered by conventional warhead or even civilian means. Biological warfare is distinguished not only by its mode of killing, but also by the potential scale of destruction associated with the disease. The fact that biological weapons have fallen into the hands of terrorist groups is well known. A terrorist attack using biological agents is known as bioterrorism. There are a huge variety of adapted bacteria and viruses that could be used as biological weapons, but one of the most common types today is Anthrax, the original biological warfare agent. This issue of the DTIC Review "Bioterrorism: A Grim Reality" offers readers at all levels information on the impending threat of bioterrorism.

### **Defense Against Toxin Weapons**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA342110&search](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA342110&search)

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA342110&searchterms=%28ADNUMBER%20CONTAINS%20%27ada342110%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada342110%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023608120416](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA342110&searchterms=%28ADNUMBER%20CONTAINS%20%27ada342110%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada342110%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023608120416)

Abstract: The purpose of this manual is to provide basic information on biological toxins to military leaders and health-care providers at all levels to help them make informed decisions on protecting their troops from toxins. Much of the information contained herein will also be of interest to individuals charged with countering domestic and international terrorism. We typically fear what we do not understand. Although understanding toxin poisoning is less useful in a toxin attack than knowledge of cold injury on an Arctic battlefield, information on any threat reduces its potential to harm. I hope that by providing information about the physical characteristics and biological activities of toxins, the threat of toxins will actually be reduced. I did not intend to provide detailed information on individual threat toxins or on medical prevention or treatment. This primer puts toxins in context, attempts to remove the elements of mystery and fear that surround them, and provides general information that will ultimately help leaders make rational decisions, protect their soldiers and win battles.

#### **Department of Defense Nuclear/Biological/Chemical (NBC) Defense Annual Report to Congress March 1999**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA362674&searchterms=%28ADNUMBER%20CONTAINS%20%27ada362674%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada362674%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023625621898](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA362674&searchterms=%28ADNUMBER%20CONTAINS%20%27ada362674%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada362674%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023625621898)

Abstract: The objective of the Department of Defense (DOD) Chemical and Biological Defense Program (CBDP) is to enable our forces to survive, fight, and win in a chemically or biologically contaminated warfare environment. The DOD CBDP provides development and procurement of systems to enhance the ability of U.S. forces to deter and defend against CB agents during regional contingencies. The probability of U.S. forces encountering CB agents during worldwide conflicts remains high. An effective defense reduces the probability of a CB attack, and if an attack occurs, it enables U.S. forces to survive, continue operations, and win. Scientific, technological, and resource limitations remain in preventing U. S. forces from having complete full dimensional protection and meeting all requirements for two nearly simultaneous Major Theater Wars.

#### **Department of Defense Plan for Integrating National Guard and Reserve Component Support for Response to Attacks Using Weapons of Mass Destruction**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA341853&searchterms=%28ADNUMBER%20CONTAINS%20%27ada341853%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada341853%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023639523263](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA341853&searchterms=%28ADNUMBER%20CONTAINS%20%27ada341853%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada341853%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93023639523263)

Abstract: The DEPSECDEF directed the development of this plan which includes the concepts, model, direction, and funding required to deliver an appropriate, substantive, integrated military support to local, state, and federal government authorities responding to the use of WMD. This plan provides a comprehensive and cohesive program consistent with national policy and DOD Directives. It integrates and advances many ongoing efforts throughout the Department and specifically addresses issues identified in a number of studies and reports. The plan supports evolving interagency plans including the FRP and the evolving Interagency Plan for WMD Response. It specifically identifies the actions required to leverage the capabilities of United States military forces. These capabilities are vital to fill the gaps in civil response assets currently prepared to respond throughout the United States. Many cities, states, and other federal agencies simply do not have the focus, the equipment, or the trained personnel needed in such a demanding environment. This plan addresses the DOD role within that context and the emergency management tasks that may require a DOD response. This plan develops capabilities for operational response to nuclear, biological, and chemical threats within the confines of the United States, its territories, and possessions. These capabilities can and should be used outside the United States when required to support validated Commander-in-Chief requirements.

### **Handshake with the Dragon: Engaging China in the Biological Weapons Convention**

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Abstract: The 1972 Biological and Toxin Weapons Convention (BWC) currently lacks procedures for verifying compliance of signatories; this shortcoming, in combination with advances in biotechnology and a changing global security environment have resulted in the continued proliferation of biological and toxin weapons (BTW). Efforts to strengthen the BWC with an inspection protocol have been hampered by disagreement over intrusive inspection and the threat it poses to national security and industrial competitiveness. Debate within the United States, however, fails to consider the impact of U.S. involvement in the inspection regime on the behavior of signatories such as China which are suspected to be violating the treaty. Michael Swaine's

model of Chinese government decision making is used to evaluate reactions to three U.S. policies toward BWC inspections. Research suggests that responsibility for BWC verification overlaps institutional interests and that U.S. participation in the protocol may have a positive effect in the Chinese cost-benefit calculation of accepting inspections. Findings suggest that one way of encouraging nations such as China in nonproliferation efforts may be to push forward and accept intrusive inspections, with an understanding of their limitations and costs.

### **Methodology for the Design and Optimal Placement of Point Detectors in a Distributed Detection System for Remote Defense Against Biological Warfare Agent Releases**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA342319&searchterms=%28ADNUMBER%20CONTAINS%20%27ada342319%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada342319%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93031872318464](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA342319&searchterms=%28ADNUMBER%20CONTAINS%20%27ada342319%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada342319%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93031872318464)

**Abstract:** This report deals with the design and performance evaluation of a distributed detection system for a dispersing biological warfare (BW) cloud embedded in the natural aerosol component of the background air. The distributed system employs a number of physically separated BW agent point detectors (sentries) located within some target region and a data fusion center that provides the final decision as to the presence or absence of the bio-target by combining the individual localized decisions from the various point detectors using a respecified combining strategy. In this system, each detector implements a generalized likelihood ratio test on its own localized observations to test for the presence or absence of a bio-target. These localized detection decisions are then transmitted to a data fusion center where they are logically combined to yield a global detection decision for the distributed system. The optimization of the global detection performance of the distributed system is derived by application of the Lagrange multipliers method, whereby the global probability of detection for the system is maximized subject to the constraint that the global probability of false alarm is maintained at a respecified level (viz., at a constant and tolerable false alarm rate). A number of combining strategies are investigated in order to determine some overall system optimality for detection. It is found that the optimal detection strategy for each individual BW agent detector in the distributed system depends on the strategy of all the other detectors, as well as on the structure of the data fusion center.

### **The Militarily Critical Technologies List -- Part II: Weapons of Mass Destruction Technologies**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA330102&searchterms=%28ADNUMBER%20CONTAINS%20%27ada330102%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada330102%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93031872318464](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA330102&searchterms=%28ADNUMBER%20CONTAINS%20%27ada330102%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIA%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada330102%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93031872318464)

[ACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada330102%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93031903620630](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA330102&searchterms=%28ADNUMBER%20CONTAINS%20%27ada330102%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93031903620630)

Abstract: The Militarily Critical Technologies List (MCTL) is a detailed and structured compendium of the technologies DOD assesses as critical to maintaining superior U.S. military capabilities. This document addresses those technologies required for development, integration, or employment of biological, chemical, or nuclear weapons and their means of delivery. This document is not oriented to U.S. capabilities. Rather, it addresses technologies that proliferators might use to develop WMD. It provides technical information to assist various entities of the DOD to develop, support, and execute counterproliferation initiatives.

### **NBC Report, U.S. Army Nuclear and Chemical Agency, Spring - Summer 1998, Volume 2, Number 2**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA355864&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355864%27%20%29%20SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355864%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93031917821189](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA355864&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355864%27%20%29%20SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355864%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93031917821189)

No summary was available on this web site for this publication.

### **A New Enemy: Silent, Lethal, and Invisible**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA346005&searchterms=%28ADNUMBER%20CONTAINS%20%27ada346005%27%20%29%20SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada346005%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93031981226112](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA346005&searchterms=%28ADNUMBER%20CONTAINS%20%27ada346005%27%20%29%20SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada346005%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93031981226112)

Abstract: Worldwide terrorism is markedly on the increase. Only recently has the United States experienced terrorism within its own shores. The possibility of a terrorist attack on the United States, utilizing a weapon of mass destruction (WMD) has increased significantly over the past decade. This paper analyzes the effects of a terrorist attack on the United States using a WMD with a biological agent. The paper addresses six major areas. First, it examines the feasibility of such an act, and second, it reviews health-related implications. Third, it examines the economic effects of such an occurrence in a large metropolitan area. Fourth, it identifies the response requirements needed to react to such a catastrophe. Fifth, it looks at the impact on civil structure and order. Finally, it identifies resources currently available to respond to a WMD attack and provides recommendations for systems still needing development and implementation in order to respond appropriately and effectively to this kind of terrorist activity.

## **Of Owl or Ostrich? The U.S. Policy of Calculated Ambiguity to Deter the Use of Chemical and Biological Weapons**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA359948&searchterms=%28ADNUMBER%20CONTAINS%20%27ada359948%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada359948%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93031993126617](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA359948&searchterms=%28ADNUMBER%20CONTAINS%20%27ada359948%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada359948%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93031993126617)

Abstract: The United States has adopted a policy of calculated ambiguity regarding the role of nuclear weapons in response to a potential chemical or biological weapons (CBW) attack. Many factors affect decisions about the role nuclear weapons play in U.S. counterproliferation strategy. This thesis describes the policy of calculated ambiguity and offers some observations about its prospects and pitfalls. The thesis presents evidence that suggests nuclear weapons could play a positive role in the U.S. counterproliferation strategy, at least in some circumstances. It also explains how such a role could conflict with the U.S. nonproliferation strategy. Such a role would also violate the nuclear taboo and be seen by a majority of countries as illegal and immoral. The United States has chosen a policy of calculated ambiguity in an attempt to retain the deterrent value of nuclear weapons without paying the political, legal, and moral costs of explicit reliance on nuclear weapons to deter the use of CBW. This may have short-term benefits, but ultimately may damage the national interest.

## **Proceedings of the International CW Destruction Symposium, Munster (Germany), 22-25 March 1998**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA353905&searchterms=%28ADNUMBER%20CONTAINS%20%27ada353905%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada353905%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032028228871](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA353905&searchterms=%28ADNUMBER%20CONTAINS%20%27ada353905%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada353905%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032028228871)

Abstract: The work described in this report was presented at the "International Symposium on the Destruction of Chemical Weapons - Technologies and Practical Aspects" in Munster, Germany in March 1998, nearly one year after the Chemical Weapons Convention entered into force, and right at the place, where German chemical warfare activities started during World War I. This symposium was arranged by the Munster IEXPO 2000 Committee (ARGE EXPO 2000) in close cooperation with the German Federal Ministries of Defence and for Foreign Affairs and was generously supported by the U.S. Army European Research Office as well. The symposium was chaired by Dr. Berud Staginnus, Director, Federal Armed Forces NBC Defence Institute Munster (WiS), and was co-chaired by Dr. Wolfgang Spyra, Full Professor, Brandenburg Technical University at Cottbus (BTU). The Federal Armed Forces NBC Defence Institute (WiS) was in charge of putting together the scientific and technical programme of this symposium, while the Munster EXPO 2000 Committee (ARGE EXPO 2000) took care of the entire symposium organization, kindly supported by all Munster Armed Forces installations.



## **A Report on NATO Field Trials on Sampling and Identification of Chemical Agents: A Description of Canadian Preparation, Participation and Recommendations**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA339110&searchterms=%28ADNUMBER%20CONTAINS%20%27ada339110%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada339110%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032201811435](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA339110&searchterms=%28ADNUMBER%20CONTAINS%20%27ada339110%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada339110%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032201811435)

Abstract: Between 9-11 September 1997, NATO conducted two field trials on the sampling and identification of chemical warfare agents. These field trials were hosted by the Centre d'Etudes du Bouchet at Vert le Petit, France. The primary objective of these trials was to assess the validity of the procedures and guidance provided in NATO Allied Engineering Publication 10 (AEP-IO) in light of the practical experience gained during these field trials. Ten nations participated in the field trials (CA, DA, FR, GE, IT, NL, NO, SP, UK and US). The performance of each sampling team was assessed by umpires using criteria developed from the relevant NATO NBC standardization agreements. The NATO report published following the field trials concluded that: a) all participating nations have fully competent and effective sampling capabilities; and b) the field trials had generally validated the guidance provided in AEP-IO. This report described Canada's preparation for, participation in and recommendations from the NATO SICA field trials. Canada believes that these field trials were extremely useful not only from a scientific view, but also for raising the profile of SICA within the military. On the military side, it helped to focus our thoughts on how SICA teams might be deployed within the Canadian Forces. While the field trials helped validate the procedures in AEP-IO, at the same time some problems were noted with respect to: a) the mandate of SICA; and b) the use of AEP- 10 Handbook as an operational document.

## **Technology Assessment of the Inspection Readiness Plan in Chemical Weapons Convention Challenge Inspections**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA352501&searchterms=%28ADNUMBER%20CONTAINS%20%27ada352501%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada352501%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032216712269](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA352501&searchterms=%28ADNUMBER%20CONTAINS%20%27ada352501%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada352501%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032216712269)

Abstract: This thesis identifies current Information Technology initiatives to help improve the Navy's Inspection Plan for Chemical Weapons Convention (CWC) challenge Inspections. The CWC is an intrusive inspection. The Challenge Inspection allows for a team of international inspectors to inspect on very short notice a naval facility suspected of violating the CWC. This thesis begins with a review of the CWC Challenge Inspection timeline. It then describes the Navy's Inspection Readiness Plan for CWC Challenge Inspections as well as the Navy Tiger Team that is sent to naval facilities to assist the Commanding Officer and base personnel during inspections. One of the initiatives evaluated by this analysis is the use of current information technology. To ascertain the feasibility of using current information technology in the CWC Challenge Inspection process, this thesis reviews Tiger Team inspection equipment, conducts

interviews with Tiger Team personnel, and assesses of the latest commercial information technology. This thesis concludes with recommendations of commercial information technology products for inclusion into the CWC Challenge Inspection process.

### **Ultimate Brinkmanship: Iraq's Use of Weapons of Mass Destruction to Raise the Stakes**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA348431&searchterms=%28ADNUMBER%20CONTAINS%20%27ada348431%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada348431%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032272515851](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA348431&searchterms=%28ADNUMBER%20CONTAINS%20%27ada348431%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada348431%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032272515851)

Abstract: This paper discusses the ability of regional powers, such as Iraq, to challenge the United States militarily within their specific region using Weapons of Mass Destruction (WMD). It looks at the US's readiness to counter proliferation of these weapons and our adversaries desire to have them to tip the balance of influence with the threat of use or actual use of WMD. This paper also looks at the reasons for the potential use by regional powers due to the erosion of traditional restraints in the international community.

### **USAF Operations in a Chemical and Biological (CB) Warfare Environment, Planning and Analysis, Volume 1**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA355610&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355610%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355610%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032262215439](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA355610&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355610%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355610%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032262215439)

Abstract: This provides Civil Engineer Readiness Flight personnel with information for planning and analysis of operations in a chemical and biological warfare environment. The handbook supports AFI 32-4001, Disaster Preparedness Operations, and the USAF CB Concept of Operations. The information contained in this handbook was extracted from various Department of Defense and Air Force publications. Information on chemical and biological warfare hazards, defensive equipment, and procedures can be found in Volumes 2, 3, and 4, respectively.

### **U.S. Military Role in Countering the Biological and Chemical Warfare Threat: Attacking the Enemy's Will**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA348427&searchterms=%28ADNUMBER%20CONTAINS%20%27ada348427%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada348427%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032249114763](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA348427&searchterms=%28ADNUMBER%20CONTAINS%20%27ada348427%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada348427%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032249114763)

Abstract: One of the greatest challenges facing the U.S. military today in the post-Cold War Era is countering the proliferation of biological and chemical weapons (BCW). These weapons of mass



destruction (WMD) not only pose a significant threat to our military forces but to global security as well. Known adversaries of the United States currently possess such weapons and will most likely employ them in future conflicts based on the perceived attractiveness associated with BCW. The U.S. military can and must play an active role in deterring the proliferation and potential employment of these horrific weapons. Attacking the adversary's will to possess or employ them is the singular, long lasting solution to a growing global crisis. The U.S. military's principal means of attacking this will is to negate the attractiveness of obtaining or already possessing a biological and chemical warfare capability. This can and must be accomplished in order to ensure global security and the protection of our forces today and into the future. Focusing our efforts otherwise is a recipe for disaster.

### **Verifying the Biological Weapons Convention: The Role of Technology in Biological Arms Control**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA360070&searchterms=%28ADNUMBER%20CONTAINS%20%27ada360070%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada360070%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032308718502](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA360070&searchterms=%28ADNUMBER%20CONTAINS%20%27ada360070%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada360070%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032308718502)

Abstract: The 1972 Biological Weapons Convention prohibits the possession and use of biological agents in war, but does not contain provisions for treaty enforcement. The Protocol to the BWC, an effort to improve enforcement of the treaty, has defined specific mechanisms for verification. This thesis examines the potential for technology to support treaty verification. First, the history of the treaty and efforts to improve it are discussed. Second, the requirements for technical support of verification are examined, and criteria are developed to evaluate potential detection systems. Then, technologies for detection and identification are illustrated, including an evaluation of currently available systems. A procedure for the implementation and support of verification technology is provided. This approach demonstrates a specific process of employing technology to enhance deterrence and verify of compliance with the BWC.

### **Worldwide Chemical Conference Ft. McClellan, AL 23-25 June 1998**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA347999&searchterms=%28ADNUMBER%20CONTAINS%20%27ada347999%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada347999%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032318619602](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA347999&searchterms=%28ADNUMBER%20CONTAINS%20%27ada347999%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada347999%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032318619602)

Abstract: This report presents topics discussed at the Worldwide Chemical Conference at Fort McClellan, AL, 23-25 Jun 1998. Some of the topics were: Total Army Analysis, Total Army Analysis Chemical Force 2005, Advanced Material Technologies for Lightweight Chemical Biological Protective Clothing, Digitizing NBC, Military Support for Response to Attacks Using Weapons of Mass Destruction, U. S. Army Technical Escort Unit, Assembled Chemical Weapons Assessment Program, World-Wide Chemical NCO Conference Chemical Stockpile Disposal

Project.

## **Conventional Arms Control**

### **The Case for Removal of U.S. Non-Strategic Nuclear Forces from Europe**

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Abstract: A number of circumstances have emerged since the demise of the Soviet Union in 1991 that tend to diminish the "value added" of U.S. non-strategic nuclear forces based in Europe. This paper examines these factors and concludes that U.S. non-strategic nuclear forces are no longer required for the security of Western Europe, provide a significant impediment to Russian-American cooperative engagement efforts and, as such, should be withdrawn.

### **FY98 Conventional Armament Technology Area Plan**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA338969&searchterms=%28ADNUMBER%20CONTAINS%20%27ada338969%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada338969%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032414825936](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA338969&searchterms=%28ADNUMBER%20CONTAINS%20%27ada338969%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada338969%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032414825936)

Abstract: Conventional armament S&T is carried out by the armament directorate at Eglin Air Force Base, FL. The primary role of the armament directorate is to perform research and development to transition conventional armament technologies that meet our customer's needs. In line with the air force's new strategic vision "global engagement: a vision for the 21st century air force," our vision is to pursue the development of the next generation precision guided conventional munitions. They must be weapons that will enable America's fighting force to target, surgically strike and disable a wide variety of targets. They must be weapons that minimize collateral damage and reduce the risk to civilian populations as well as the environment.

### **Foreign Military Sales: Millions of Dollars of Nonrecurring Research and Development Costs Have Not Been Recovered**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA355594&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355594%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355594%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=930324846731](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA355594&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355594%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355594%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=930324846731)

Abstract: The Arms Export Control Act gives the President authority to sell defense articles and services to eligible foreign countries, generally at no cost to the U.S. government. While the

Defense Security Assistance Agency (DSAA) has overall responsibility for administering the program, the Army, Navy, and Air Force normally execute the sales agreements--commonly referred to as sales cases. Foreign military sales are made on an individual case basis. The cases are initiated by a foreign country representative sending a letter of request to DOD asking for various information, such as precise price data. Once the customer decides to proceed with the purchase, DOD prepares a Letter of Offer and Acceptance (LOA) stating the terms of the sale for the goods and services being provided. The Arms Export Control Act requires that, after September 30, 1976, letters of offer for the sale of major defense equipment shall include a proportionate amount of nonrecurring costs related to the research, development, and production of major defense equipment DOD interpreted the act as requiring the recovery of these costs on a pro rata basis. The military services calculate the pro rata rate by dividing the total research and development and other one- time production costs by the anticipated total number of units to be produced for both domestic and foreign use. A separate charge is calculated for each item of major defense equipment and is included in the LOA as part of the price that its customers are to pay for the purchase of major defense equipment.

### **Implications of Threat Perceptions on Security Cooperation in the Association of Southeast Asian Nations**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA350060&searchterms=%28ADNUMBER%20CONTAINS%20%27ada350060%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada350060%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303250162213](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA350060&searchterms=%28ADNUMBER%20CONTAINS%20%27ada350060%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada350060%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303250162213)

Abstract: This paper investigates the impact of national threat perceptions on security cooperation within the Association of Southeast Asian Nations (ASEAN). The research includes a review of alliance theory and a study of security regimes which have historically influenced cooperation in Southeast Asia, namely the Southeast Asia Treaty Organization (SEATO), the Five Power Defense Arrangement (FPDA), and security initiatives of ASEAN and the ASEAN Regional Forum (ARF). Using case studies on the key states of Indonesia, Thailand, and Vietnam, a comparative analysis identified the following common threat perceptions: (1) security of the maritime zones; (2) contributions by external forces to internal instability; (3) regional disputes impinging on the sovereignty of one or more of the ASEAN states; and (4) uncertainty over China's interests in Southeast Asia. As an organization of small states not having a significant security guarantor, ASEAN must consider improvements in cooperative security without antagonizing China. An acceptable option for ASEAN is to pursue new increased military cooperation in response to non-state-sponsored threats, such as piracy or natural disaster. This would enhance ASEAN's capability to defend against less benign state-sponsored threats while maintaining conditions favorable to diplomacy and regional stability in Southeast Asia.

### **Legal and Ethical Guiding Principles and Constraints Concerning Non-Lethal Weapons Technology and Employment**

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Abstract: Development and employment of non-lethal weapons and their associated technologies require legal and ethical review prior to the procurement and acquisition process. Non-lethal technologies apply to the entire spectrum of conflict in the post Cold-War environments, including Military Operations Other Than War. However, the use of these non-traditional methods must still adhere to the same principles which have historically guided the conduct of our armed forces, namely, humanitarian law, customary international law, and the Law of Armed Conflict. The unconventional technologies associated with non-lethal weapons make them sensitive to the provisions of more recent treaties and conventions, including the Chemical and Biological Weapons Conventions and the four Protocols of the Certain Conventional Weapons Convention and the appended 1995 Supplement. In addition, other treaties such as the Nairobi International Telecommunications Convention and the Montreal Protocol on the Substances that Deplete the Ozone Layer may impact the use of certain non-lethal weapons technologies.

### **A Mine is a Terrible Thing to Waste: The Operational Implications of Banning Anti-Personnel Landmines**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA357010&searchterms=%28ADNUMBER%20CONTAINS%2027ada357010%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%2027ada357010%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303253234109](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA357010&searchterms=%28ADNUMBER%20CONTAINS%2027ada357010%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%2027ada357010%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303253234109)

Abstract: Approximately 25,000 people each year fall victim to the estimated 110 million anti-personnel landmines (APL) scattered throughout the world. Most of the victims are non-combatants in third-world and developing nations. Because most APL are cheap to procure, long-lasting once employed, and totally indiscriminate concerning their choice of victims, the world has begun to vilify these so-called slow motion weapon of mass destruction. Thus in December of 1997 did 122 nations join with Canada in signing the provisions of the Ottawa Process -- an agreement that bans universally the use, sale, and transfer of all APL. Absent from the roll of signatories was the United States. The president was willing to end U.S. use of conventional APL, except in Korea, but was convinced by the Joint Chiefs of Staff that scatterable (self-destructing) APL were critical to the Army's counter mobility doctrine and did not contribute to the humanitarian problem. Nonetheless, congress passed a unilateral law requiring a one-year moratorium on U.S. use of all APL, except along internationally recognized national borders (read Korean DMZ). This monograph examines whether or not the U.S. can fulfill its current war fighting contingencies without the use of APL. The monograph begins by describing the global nature of the APL problem and examining the events that led to the Ottawa treaty and the congressional "Use Moratorium." Ban activists (including many members of congress) have gone to great lengths to show that APL do not have -- in fact have never had -- significant military utility. Therefore, the next section of this paper consists of historical analyses

of the past use of APL in the PACOM (Korea), and CENTCOM (Southwest Asia/Middle East) areas of responsibility (AORs) -- the two areas that represent present-day military contingencies.

### **New Technology Required to Implement U.S. Anti-Personnel Landmine Policy**

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Abstract: Current U.S. APL policy seeks to accomplish three major objectives. First, it seeks to ensure that American military personnel will have the tools they need to accomplish their global responsibilities. Second, it seeks to ensure that U.S. APL do not cause unintended casualties. It also expands the U. S. role in reducing casualties by non-U.S. landmines. Third, it seeks a responsible treaty to ban APL without unduly compromising military concerns. The objective of this paper is to demonstrate how the development and application of improved mine, counter-mine, and demining technology could facilitate, significantly in some cases, the three major APL policy objectives of the United States.

### **Military Operations, Strategy and Tactics Chemical, Biological and Radiological Warfare**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA351448&searchterms=%28ADNUMBER%20CONTAINS%20%27ada351448%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada351448%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303257817028](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA351448&searchterms=%28ADNUMBER%20CONTAINS%20%27ada351448%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada351448%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303257817028)

Abstract: The German definition of Nonlethal Weapons is a technical means whose intention is to obviate (prevent or stop) hostile operations without causing death or lasting injury to human beings. In addition, secondary effects caused by the use of those means to innocent people, property, and environment shall be minimized.

### **Nonlethality and American Land Power: Strategic Context and Operational Concepts**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA349010&searchterms=%28ADNUMBER%20CONTAINS%20%27ada349010%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada349010%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303260088649](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA349010&searchterms=%28ADNUMBER%20CONTAINS%20%27ada349010%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada349010%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303260088649)

Abstract: As great changes taking place in the global security environment, American land power must be adapted to assure it can continue to protect and promote U.S. national interests. This requires the development and integration of a range of new technologies, concepts and organizations. Among these, nonlethality (using armed force in a way that minimizes casualties) shows promise for specialized applications. To that end, the authors discuss

nonlethality of armed forces within its larger strategic context and explain how it is related to the revolution in military affairs. They then assess the arguments for and against the integration of nonlethality into American doctrine and procedures. Finally, they offer operational concepts which could serve as the basis for doctrine and for tactics, techniques, and procedures.

### **The Strategic Implications of the Use of Nonlethal Force**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA341112&searchterms=%28ADNUMBER%20CONTAINS%20%27ada341112%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada341112%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032721916723](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA341112&searchterms=%28ADNUMBER%20CONTAINS%20%27ada341112%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada341112%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032721916723)

Abstract: The national defense strategy of the United States is based on the premises of shaping the environment, responding to existing threats and preparing for the future. Non-lethal technologies can influence all these requirements. Like most nations, America uses its diplomatic, informational, military and economic resources to affect national policy. Nonlethal technologies can impact all the elements of national power, not just the military ones. This paper will examine emerging nonlethal technologies as well as those currently available. It examines the moral and legal implications of using nonlethal weapons, as well as potential conflicts with existing American treaties. It will examine the issue of nonlethal weapons changing the essence of military force. Finally, it will address the question of the long term uses these instruments will have in U.S. national policy.

### **U.S. Anti-Personnel Landmine Policy vis-a-vis the Ottawa Anti-Personnel Landmine Treaty**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA344861&searchterms=%28ADNUMBER%20CONTAINS%20%27ada344861%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada344861%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032618110329](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA344861&searchterms=%28ADNUMBER%20CONTAINS%20%27ada344861%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada344861%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93032618110329)

Abstract: Anti-personnel landmines (APL) left in the aftermath of various conflicts around the world claim a multitude of civilian victims each year. Dismay with this annual human toll spawned a worldwide movement to ban the manufacture, use or sale of APL, culminating in Ottawa, Canada on 3 December 1997 when 122 nations, but not the United States, signed a treaty implementing such a ban. While the United States supports the general goals of the treaty, our current APL policy is not in accord with an absolute ban. Instead, US policy preserves our ability to use non-self-destructing APL along the Korean DMZ and self-destructing APL worldwide. This paper will show that US APL policy is sound and that we should not sign the Ottawa Treaty.

### **Nuclear Proliferation**

#### **Aiken for Armageddon: The Savannah River Site and Aiken, S.C., 1950-1955**



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Abstract: Constructed between November 1950 and March 1955, the Savannah River Site (SRS) nuclear production facility was a product of the Cold War and its accompanying arms race. The first Soviet atomic detonation in 1949 shook the foundations of American Cold War diplomacy. Although the diplomatic situation with the Soviets had never been amicable since the end of World War 2, the atomic bomb had provided a psychological edge for American policy makers. Worried about the military balance of power in the aftermath of the unanticipated Soviet test, President Harry S. Truman authorized research for construction of a hydrogen or fusion weapon. The program required a new nuclear weapons facility to produce the hydrogen isotope tritium in sufficient quantities to create a large stockpile of fusion weapons.

### **Briefing Book - Volume 1: The Evolution of the Nuclear Non-Proliferation Regime (Fourth Edition)**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA346879&searchterms=%28ADNUMBER%20CONTAINS%20%27ada346879%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada346879%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93033355329188](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA346879&searchterms=%28ADNUMBER%20CONTAINS%20%27ada346879%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada346879%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93033355329188)

Abstract: This is the fourth edition of PPNN Briefing Book (Volume I). The first edition was originally produced for delegates attending the 1990 NPT review Conference, the second for those attending the 1995 NPT Review and Extension Conference and the third for those attending the 1997 session of the Preparatory Committee of the 2000 NPT Review Conference. Both this Volume and a new Volume II (which consists of key non-proliferation treaties, agreements and other relevant documentation) are presented in a format designed to facilitate their use as reference materials for delegates attending the 1998 Preparatory Committee meeting for the 2000 NPT Review Conference which will be held in Geneva from 27 April to 8 May.

### **Nuclear Nonproliferation and Safety; Uncertainties About the Implementation of U.S.-Russian Plutonium Disposition Efforts Descriptive Note: Report to the Chairman, Committee on Foreign Relations, U.S. Senate**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA335329&searchterms=%28ADNUMBER%20CONTAINS%20%27ada335329%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada335329%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303338281400](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA335329&searchterms=%28ADNUMBER%20CONTAINS%20%27ada335329%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada335329%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303338281400)

Abstract: From World War II to the end of the Cold War, the United States and the former Soviet

Union produced large quantities of plutonium to build nuclear weapons. With the lessening of tensions between the United States and Russia, efforts began to reduce the inventory of both countries' excess plutonium. In early 1994, Presidents Clinton and Yeltsin endorsed the goal of nuclear arms reduction and directed experts to begin studying options for the long-term disposition of plutonium and other nuclear materials. In 1995, the United States declared that 38.2 metric tons of weapons-grade plutonium was no longer needed for national security and was, therefore, excess. DOE also designated 14.3 metric tons of non-weapons-grade plutonium as excess. Because a portion of the plutonium declared excess is scrap or residue with low contents of plutonium, it is unsuitable for fabrication into mixed oxide (MOX) fuel and is better suited for immobilization instead. According to DOE, plutonium scheduled for disposition will come primarily from (1) metal that may have been in a retired nuclear weapon, (2) oxides, (3) unirradiated fuel, and (4) irradiated fuel. Securing plutonium derived from these sources will require conversion into forms that meet the 'spent fuel standard.' This standard, which was introduced by the National Academy of Sciences and endorsed by DOE, requires that plutonium be made roughly as unattractive and difficult to retrieve and use in nuclear weapons as the plutonium that exists in spent fuel from commercial nuclear power reactors. DOE plans to convert about 50 metric tons of excess plutonium into forms suitable for eventual disposal. Of the total, DOE plans to immobilize about 17 tons and could process the remainder as MOX fuel, although a final decision on whether to burn or immobilize this plutonium has not been made.

### **Nuclear Nonproliferation: Difficulties in Accomplishing IAEA's Activities in North Korea**

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Abstract: This report discusses the status of IAEA's activities under the Agreed Framework, including IAEA's (1) nuclear-freeze-monitoring activities, (2) inspections of facilities not subject to the freeze, and (3) plans to verify the accuracy and completeness of North Korea's 1992 declaration of the amount of nuclear material in its possession.

### **Nuclear Proliferation; Uncertainties with Implementing IAEA's Strengthened Safeguards System**

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Abstract: International Atomic Energy Agency (IAEA) safeguards are a cornerstone of U.S. and international efforts to prevent nuclear weapons proliferation. Since the early 1970s, the international community has relied on IAEA safeguards to independently verify that non-nuclear weapon states are complying with their obligations under the Treaty on the Non-proliferation of



Nuclear Weapons (NPT) not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices. Under the NPT, states with comprehensive safeguards agreements must declare all nuclear material to the Agency. IAEA then regularly inspects all facilities or locations containing declared material to verify its peaceful uses. The discovery that Iraq had developed a clandestine nuclear weapons program while IAEA was inspecting Iraq's civilian nuclear facilities caused the Agency and its member states to initiate an intensive effort to strengthen further the safeguards system. This report (1) describes the changes IAEA is undertaking to strengthen its safeguards program, (2) assesses the reasonableness of IAEA's assumptions regarding the impact of these changes on program costs and efficiency, and (3) comments on the extent of IAEA's reliance on the United States to finance the Agency's safeguards activities.

### **Nuclear Weapons, Proliferation, and Terrorism: U.S. Response in the Twenty-First Century**

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Abstract: As the remaining superpower in the post-Cold War world, the U.S. needs to reevaluate its policy toward the growing threat to U.S. national interests and the effects of weapons of mass destruction (WMD), specifically nuclear devices, and their use by terrorist groups against U.S. interests abroad. As the world reacts to the implosion of the former Soviet Union, there are increased numbers of nations and possibly terrorist groups trying to become players in the international arena. This study describes the ease of obtaining the scientific knowledge, plans, and materials to enable a terrorist's construction of a nuclear device. It also analyzes motivation of terrorist groups, concluding that a nuclear weapon, capable of inflicting violence in the extreme, fulfills the terrorist's goal of violence in support of a political agenda or to inspire radical change. Given the guidance from the national level, this study proposes a series of policy options available to the NCA for application in an aggressive counterproliferation policy. Finally, the U.S. must rapidly reorganize its counterproliferation structure and methods to streamline a more aggressive approach that is recognized and feared by potential nuclear terrorists; augment current political efforts with a clearly defined counterproliferation military mission and associated doctrine.

### **Returning from the Brink: Is There a Theory-Based Explanation for the Attenuation of Horizontal Nuclear Proliferation?**

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Abstract: The purposes of this study are to identify reasons for decisions by seven countries in the

1990s to abjure nuclear weapons and to apply international relations theory to interpret those decisions. In order to ascertain reasons behind these national decisions this study uses the structured, focused comparison methodology. This approach enables a researcher to investigate systematically the similarities, as well as differences, between cases that suggest generalizations. Further, because this methodology uses standardized questions that can include variables germane to a particular issue policy-relevant results can be obtained. The second purpose of this study is accomplished by applying three theories to interpret case study findings. Neorealism has been the most prominent theory of international relations since the late 1970s, and it has been used to explain decisions by states to acquire nuclear weapons. Therefore it is important to determine whether this theory can be used to interpret decisions by countries to abjure nuclear arms. Since neorealism may not be entirely adequate in this regard, two other theories, neoliberal institutionalism and constructivism, are also applied because they call greater attention to international factors in domestic politics and the role of domestic factors in international relations, respectively. This study shows that none of the three theories alone is adequate to interpret decisions by national governments to abjure nuclear weapons. Each theory is useful to interpret certain actions by some states, but is less illuminating in other instances. More thorough interpretations seem to reside within the purview of inquiries by scholars who have endeavored to elaborate and to refine neorealism, and thereby to synthesize this theory with elements of neoliberal institutionalism and constructivism to create two-level, multi-factor heuristic frameworks.

### **When Sukarno Sought the Bomb: Indonesian Nuclear Aspirations in the Mid-1960s**

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**Abstract:** Proponents of nuclear nonproliferation, such as the United States, seek to develop policies that address the root causes of nuclear proliferation. The discipline of international relations aids in this effort by providing theories that attempt to explain why states choose to build nuclear weapons. Most theories simplify the process of proliferation by using only one of three generally accepted explanations: security, domestic politics, or norms. The case of Indonesia, however, illustrates that proliferation is best explained by investigating all three dimensions as well as the role of technology. This thesis evaluates competing theories of nuclear proliferation using a historical case study of Indonesia's aspirations to acquire nuclear weapons during 1964-1965, and supports the view that multiple variables are necessary to explain the spread of nuclear weapons. As evidence, this thesis examines Indonesian President Sukarno's little-known nuclear aspirations in the mid-1960s. Although Sukarno was ultimately unsuccessful in his effort to acquire atomic weapons, his decision to seek them was influenced by a variety of factors that included Indonesia's security needs, domestic political considerations, norms, and available nuclear energy technology.

### **Nuclear Testing**

## **Test Ban Treaty and Its Security Implications for the United Kingdom and the United States**

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**Abstract:** The United Kingdom has signed and ratified the Comprehensive Test Ban Treaty. The United States signed the treaty in September 1996, and currently the decision on whether to ratify it is pending in the Senate. Key differences reside in the political and objective strategic situations of the United States and the United Kingdom. In the United Kingdom's parliamentary system a single party (or a coalition) makes decisions. The United States, however, was designed to have a separation of powers, and this insures that the legislative and executive branches have opportunities for discord as well as cooperation. Currently the United Kingdom has operational weapons production facilities, whereas the United States does not. The United Kingdom has only one nuclear weapons program (the Trident missile) to maintain, whereas the United States has multiple delivery systems and warhead types to maintain. The United Kingdom's nuclear deterrent provides for the country's security needs, yet the United Kingdom is also covered by U.S. nuclear commitments. Indeed, the United States provides extended deterrence protection for allies and security partners around the world. These responsibilities imply that the implications of the CTBT could be more momentous for the United States than for the United Kingdom.

### **Signatures of Aging**

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**Abstract:** The Department of Energy and its three weapons laboratories (LANL, LLNL, and SNL) have developed a Stockpile Stewardship and Management Program (SSMP) in response to their designated mission of maintaining an effective, i.e. reliable and safe, nuclear deterrent without underground nuclear tests (UGTs). The need to ensure the effectiveness of an aging stockpile presents new challenges of major importance. In this study we review what is known about the aging of critical constituents, particularly the high explosives, polymers, and metals in the enduring stockpile. We discuss data that are required to provide a fuller understanding of aging, and how to obtain that data as a basis for anticipating and addressing potential stockpile problems. Our particular concern is problems that may arise in the short term, i.e. within the next 5 to 10 years, and their implied requirements for preventive maintenance and remanufacture.

**2D and 3D Modeling of Seismic Wave Propagation in the Heterogeneous Lithosphere in the Context of Nuclear Test Ban Monitoring. Descriptive Note: Final Technical Report, 15 May 94-14 Aug 97**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA336858&searchterms=%28ADNUMBER%20CONTAINS%20%27ada336858%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada336858%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93033699423119](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA336858&searchterms=%28ADNUMBER%20CONTAINS%20%27ada336858%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada336858%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93033699423119)

Abstract: Research efforts have been devoted to topics highly relevant to CTBT monitoring issues. Research involved the following topics: (1) NATO ASI symposium in Alvor, Portugal 23 Jan - 1 Feb 1995 on CTBT monitoring; (2) Local event recordings; (3) Novaya Zemlya seismic events; (4) The seismology problems involving the Lg-blockage across geomorphical features like mountain ranges and grabens; (5) Simulating seismic wave propagation in the crust and upper mantle; (6) Three-dimensional finite-difference modeling of scattering from free surface topography; (7) The comparison of two and three dimensional finite-difference modeling of scattering from free surface topography; (8) Seismic source classification; and (9) Signal site recognition.

## **Regional Arms Control**

### **Arms Control and Disarmament Between India and Pakistan - An Appraisal**

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Abstract: The Paper examines the possibilities and prospects of exercising the option of arms control and disarmament to improve adversarial relations between India and Pakistan. The experiences of arms control and disarmament regimes in Europe and the Middle East are discussed to assess their feasibility in India-Pakistan scenario. Finally, the conclusions are drawn concerning opportunities for a peaceful South Asia.

### **Morning Calm, Nuclear Sunset: South Korea's Atomic Option**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA354303&searchterms=%28ADNUMBER%20CONTAINS%20%27ada354303%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada354303%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303385013247](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA354303&searchterms=%28ADNUMBER%20CONTAINS%20%27ada354303%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada354303%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303385013247)

Abstract: U.S. national security strategy sets nuclear nonproliferation as a high priority. However pursuing nonproliferation without regard for important traditional security relationships might yield undesired results. The Republic of Korea (ROK) requires a high degree of confidence in the U.S. security guarantee one that includes an extended nuclear deterrent. The nuclear weapons program that South Korea began and abandoned in the 1970s was prompted by a decrease in

confidence in U.S. security commitments. Conciliatory actions taken recently by the United States toward the Democratic Peoples' Republic of Korea (DPRK) to prevent a possible nuclear weapons program may undermine the U.S.-ROK security arrangement that has been in place for decades. This work examines perceived threats to South Korea and the U.S. security commitment to Korea since 1945 to reveal how U.S. nuclear nonproliferation policy affects Seoul's propensity to develop nuclear weapons. Recommendations are provided for policy makers regarding strengthening of ROK confidence in the U.S. commitment on the peninsula, with particular emphasis on preventing South Korea from pursuing a nuclear arsenal.

### **Multilateral Security Cooperation and the ROK-U.S. Relationship: A Korean Perspective**

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Abstract: Structural change has occurred in the security environment of the Northeast Asian region. The countries neighboring with the Korean peninsula now realize the necessity of a comprehensive security agreement. Under this circumstance, the Multilateral Security Cooperation (M.C.) is imperative for regional areas to support Korean reunification and to accept a unified Korea as non-threatening. Therefore, the Republic of Korea should share in creating a multilateral security cooperation system in the region, as well as enhance a more solid alliance with the United States. Consequently, the ROK should persevere in its efforts to guide North Korea to join the dialogue and to realize the Basic Agreement. Bilateral security arrangements and growing M.C. are mutually reinforcing. The ROK-U.S. relationship should be focused on reunification-oriented security cooperation for peaceful coexistence and promotion of reunification.

### **Russia's Armed Forces on the Brink of Reform**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA342548&searchterms=%28ADNUMBER%20CONTAINS%20%27ada342548%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada342548%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303393929145](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA342548&searchterms=%28ADNUMBER%20CONTAINS%20%27ada342548%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada342548%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303393929145)

Abstract: The author analyzes the so-called military reform of the former Soviet and now Russian military forces. He assesses Russian defense policy as Russia has begun lately to grapple with the enormous challenges that are inherent in the process of military reform. The outcome of this process will have profound implications, not only for Russia, but the its neighbors and partners, chief among them being the United States. Given the coincidence of this reform process with what many believe to be a revolution in military affairs and the continuing urgency of reducing nuclear threats, the ongoing observation of Russian military policies remains very important for the United States.

## **Whither a Common Security for Southeast Asia?**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA350044&searchterms=%28ADNUMBER%20CONTAINS%20%27ada350044%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada350044%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93033967910918](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA350044&searchterms=%28ADNUMBER%20CONTAINS%20%27ada350044%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada350044%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93033967910918)

**Abstract:** This thesis investigates the concept of common security in Southeast Asia. It examines the likelihood of the Southeast Asia countries developing some form of common security architecture within the time frame of the next ten to fifteen years. The concept of comprehensive security, encompassing elements of economic, political, internal (social) and military security, was used to identify the security interests of the Southeast Asia countries. The NATO common security model was then used as a baseline model for comparison to identify the necessary and sufficient conditions for a common security model for Southeast Asia. Through the process, the characteristics and likely form of a Southeast Asia common security model were identified. The conclusion highlights that further cooperation or integration in the military security dimension will have to be founded upon the economic security and internal political stability dimensions, which will form the cornerstones to the overall efforts in developing a comprehensive common security in Southeast Asia.

## **Strategic Arms Control**

### **The Abolition of Nuclear Weapons: Implications for U.S. Security Interests**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA359908&searchterms=%28ADNUMBER%20CONTAINS%20%27ada359908%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada359908%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93034015613805](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA359908&searchterms=%28ADNUMBER%20CONTAINS%20%27ada359908%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada359908%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93034015613805)

**Abstract:** This thesis analyzes the arguments concerning the abolition of nuclear weapons, specifically the feasibility and desirability of nuclear disarmament. Past attempts at nuclear disarmament and relevant international treaties and legal opinions also are discussed. The nuclear disarmament movement has grown considerably since the end of the Cold War. As the idea of abolishing nuclear weapons gains influence, it may have an increasing impact upon national security policy. Abolitionists argue that nuclear disarmament is both desirable and feasible. This thesis concludes that nuclear disarmament is not feasible and that abolitionist arguments for the desirability of nuclear disarmament are flawed. States will continue to maintain nuclear arsenals for the foreseeable future. It would be unwise and dangerous for the United States to pursue a policy of nuclear disarmament in the near term.

## **Air-Launched Target System Concept NMD Testing**

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Abstract: National Missile Defense (NMD) targets are essential for system certification. However, current targets have strategic ballistic missile heritage and require fixed land-based facilities for launch operations. In addition, the target mission profile is further constrained by range safety requirements, limited ground data acquisition resources and treaty constraints. The result is a test scenario with a target launch from a known point with a predictable flight profile. The development of a complementary mobile air-launched target system that provides increased flexibility will enhance operational testing. The Target Launch System (TLS) concept includes Target Launch Vehicle (TLV), Carrier Aircraft (CA) and Ground Support (GS). TLS concept components were evaluated against program requirements for reliability, threat representation, treaty constraints, operational flexibility, and range restrictions. The selected NMD TLS uses an air-launched, three-stage TLV operating with existing facility and range assets. The selected concept complies with key NMD test requirements while accommodating range restrictions and treaty constraints. The mobility of the air-launched target will complement ground-based systems and fully stress the NMD system architecture. This is a notional target launch system that has not yet been endorsed by the NMD Joint Program Office (JPO).

### **Ballistic Missile Defense and ABM Treaty Limitations**

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Abstract: The U.S. must critically evaluate our current ballistic missile defense (BMD) strategy. In today's geostrategic context, is it sound strategy to continue to impose 1972 ABM Treaty restrictions on BMD systems development? This study considers three alternatives with respect to the ABM Treaty and BMD. Our current policy (alternative one) is analyzed using the ends, ways and means model. This analysis covers the current state of the ballistic missile threat; the current situation with respect to the ABM Treaty; and technical risks associated with BMD systems. As a second alternative, the study examines the possibility of mutual accommodation with Russia. This alternative requires the U.S. and Russia to reach mutual accommodation on missile defense; allowing both nations some level of NMD, while maintaining mutual deterrence through "assured destruction." The Heritage Foundation's Team B Study Group proposal provides a third alternative. Team B proposes a sea- and space-based BMD system and for the U.S. to withdraw from the ABM treaty now so it will no longer arbitrarily restrain U.S. BMD. This study concludes it is critical to U.S. National Security for America to withdraw from the ABM Treaty now and deploy a BMD system, perhaps based on the Team B proposal.

### **Ballistic Missile Defense Technology Overview for the 7th Annual AIAA Technology Readiness Conference**



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Abstract: The purpose of this report is to provide overview of the ongoing National Missile Defense Program to the AIAA/BMDO Technology Readiness Conference.

## **Chinese Security Interests and US Ballistic Missile Defenses**

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Abstract: The People's Republic of China (PRC) has undertaken extensive military modernization efforts in the post-Cold War period. Many of these efforts are directed at curbing what the Chinese consider unchecked US influence in the Asia-Pacific region. Continuing efforts by the United States to develop and deploy ballistic missile defenses (BMD) threaten to undermine the PRC's sole overseas power projection instrument, ballistic missiles, leaving Beijing with a seriously weakened repertoire for coercion and undermining Beijing's long-term goal of acquiring the ability to counter US influence. This thesis examines China's national security interests in the near future and the ballistic missile defense capabilities being pursued by the United States. It then analyzes the implications of the potential competition between US BMD and Chinese ballistic missiles for Sino-American security relations.

## **Countering the Proliferation of Weapons of Mass Destruction: The Case for Strategic Preemption**

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Abstract: The declaratory policy of the United States is to prevent the acquisition of Weapons of Mass Destruction (WMD) and their delivery systems. The United States has been hesitant to use military force to preempt the acquisition of WMD even with recalcitrant proliferators whose intentions and demonstrated behavior are counter to the interests of the U.S. This paper outlines the case for backing our declared policy with more aggressive counter-proliferation actions, and describes those cases where preemptive conventional military actions are not only appropriate, but are in the best long term interests of the United States.

## **Dealing with Cruise Missile Proliferation: The Emerging Threat and Nonproliferation**

## Challenges

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Abstract: A militarily significant land-attack cruise missile (LACM) threat to U.S. interests could emerge within a decade. Key indicators of the emerging threat include, (1) the rapid growth of Commercially available enabling technologies usable in cruise missiles, (2) the globalization of the manned aircraft industries and expertise required to develop and integrate cruise missile technologies and equipment, and (3) the potential for exports from the industrialized world of Sensitive technologies usable in the development of advanced cruise missiles. In its Introduction, this paper will describe unique aspects of the threat posed by LACMs---they can be designed for exceptional prelaunch survival, air-defense penetration, and highly accurate weapon delivery. Low-flying cruise missiles are a particularly effective delivery means for chemical and biological weapons. These features might be so attractive to rogue states that cruise missiles could in the future be the delivery system of greatest concern to U.S. and allied defense planners. Section 1 of the paper will examine the diverse sources of cruise missiles and related technologies and equipment, a diversity that makes these weapons particularly difficult to control. The paper will focus on how advanced cruise missiles could be acquired by rogue or unstable countries. To illustrate the threat, classified technical analysis will be presented on a state-of-the-art foreign LACM that has been offered for export. The paper will next examine ASCM conversion, a potential "shortcut" to LACM acquisition. Over 70 countries possess ASCMs and at least one rogue state may have already converted ASCMs for land-attack missions. Technical analysis of ASCM conversion options will be derived from a new classified study (Morphing the Silkworm: A Case Study in the Conversion of Antiship Cruise Missiles for Land Attack) completed by the authors for the Defense Advance.

## Feasibility Evaluation of Employing a Sea-Based Adjunct to the United States' National Missile Defense Strategy

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Abstract: Germany's development and employment of the V-2 rocket in World War II ushered in a new era in warfare. During the Cold War, mutual assured destruction (MAD) was a key precept of both United States and Soviet Union strategic nuclear deterrence strategies. With the Cold War over, concern over the rapid proliferation of weapons of mass destruction amongst Third World rogue nations and the threat of an accidental or unauthorized ballistic missile attack has overtaken concern for an intentional nuclear attack by the former Soviet Union. Significant congressional legislative efforts have led the Department of Defense to develop a national missile

defense (NMD) strategy employing ground- based interceptor missiles to defend all fifty states from a limited ballistic missile attack. This thesis shows that a sea-based adjunct to a land-based system would be operationally and technically feasible, and it would provide significantly enhanced defensive capabilities over a land-based only NMD system. This study also uses legal treaty interpretation methods to show that the deployment of any NMD system would require modification to or withdrawal from the ABM Treaty. And if the United States decides to pursue modifications to the ABM Treaty, this thesis recommends they include allowances for sea-based NMD systems.

### **Fundamental Deterrence and START III**

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Abstract: The public's brief respite from the specter of nuclear holocaust abruptly ended in May 1998 when India, 24 years after its only successful nuclear weapon test, detonated five more just sixty miles from its border with Pakistan. The tests ignited fears of nuclear conflagration that had been dampened, if not prematurely extinguished, by the collapse of the Soviet Union nearly ten years earlier. Pakistan quickly declared itself a nuclear power and threatened tests of its own. Various capitals issued condemnations and an assortment of largely symbolic political and economic sanctions. India then proclaimed a moratorium on further testing and announced its willingness to accede to the Comprehensive Test Ban Treaty as a declared nuclear power. Inevitably, India's tests will prompt Pakistan and China accelerate their own nuclear programs, to the detriment of regional stability in South Asia. America's chimera of nuclear nonchalance, if it ever existed at all, has certainly vanished.

### **The Fundamental Issues Study within the British BMD Review**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA353915&searchterms=%28ADNUMBER%20CONTAINS%20%27ada353915%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada353915%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93034267329694](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA353915&searchterms=%28ADNUMBER%20CONTAINS%20%27ada353915%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada353915%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93034267329694)

Abstract: Synoptic and independent assessment of the approach Britain should adopt to BMD. Among the aspects considered have been geopolitics, threat development, the technological environment, the operational context, the principle of comparative costing, arms control, pollution effects, industrial collaboration, and participation in Space. The aim has been to think laterally about the linkages between issues, not least as between technical/operational considerations and geopolitical or philosophical ones.

### **Further Tactical Nuclear Weapons Reductions in Europe: The Next Challenge for Arms**

## Control

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Abstract: The dissolution of the Warsaw Pact and Soviet Union has removed the traditional Cold War logic and security rationale for the forward deployment of theater nuclear weapons (TNWs) in Europe. Moreover, with a reduction of almost 90 percent of U.S. TNWs from NATO soil, the debate continues on whether or not there still exists such a requirement, as well as making it more difficult for key decision makers to clearly articulate their future relevance. Based on these conditions, the research question for this monograph is to determine what creative steps, proposals or measures would merit consideration and help jump start dialogue between the U.S. and Russia for deeper reductions in their TNW stockpiles, as well as to define the associated issues, obstacles and challenges. Both the U.S. and Russia's histories are replete with successful arms control examples. So surely both sides can look to their past to find prescriptions of how to deal with the development of disarmament measures that can be undertaken to generate the needed debate necessary to lead to the institution of new arms control measures and agreements, as well as preserve a credible, effective deterrent in the face of growing challenges to maintaining a stable European security environment and strategic relationship in the years to come. The monograph begins with an historical review on the evolution of NATO's nuclear strategy, focusing almost exclusively on the conditions that warranted the introduction and employment of TNWs into Europe. Additionally, it will highlight some of the economic and national security influences that led to changes in NATO's nuclear strategy and the development of policies that carefully linked TNWs to strategic nuclear weapons to reassure a U.S. commitment to Europe and provide decisionmakers greater flexibility through multiple options to respond to any aggression.

## Generating Bomber Routes for the Delivery of Gravity Weapons

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA342166&searchterms=%28ADNUMBER%20CONTAINS%20%27ada342166%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada342166%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=930342848668](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA342166&searchterms=%28ADNUMBER%20CONTAINS%20%27ada342166%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada342166%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=930342848668)

Abstract: United States Strategic Command (USSTRATCOM) is updating the Arsenal Exchange Model (AEM) that it uses for allocating strategic weapons to targets. AEM does not model the range constraints on bomber routes. These routes are used to deliver gravity munitions. In order to include these constraints in the new method, the Weapons Allocation Model (WAM), a pool of routes that satisfy the range constraints needs to be created. The number of possible routes to consider is extremely large and it is not possible to enumerate them all. Therefore, the method to form the pool of routes needs to reduce the number of routes considered and selected to a manageable number. This research examines several methods for generating routes in an attempt to find the best method. All of these methods use implicit enumeration to create a pool of

routes. The best method uses a combination of distance and flight direction to restrict the number of targets available to generate a route. However, the reduction provided by this method is not large enough and preprocessing the target database is also used. The method is tested against sample problems of several sizes to find the best way to use the method to generate routes in a problem of comparable size to the USSTRATCOM problem.

### **A Human Factors Evaluation of ESAR/ATR Integration for the Theater Missile Defense (TMD) Automatic Target Recognition (ATR) Rapid Response Targeting Against Mobile Ground Targets (RTM) Program**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA361260&searchterms=%28ADNUMBER%20CONTAINS%20%27ada361260%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada361260%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303430461829](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA361260&searchterms=%28ADNUMBER%20CONTAINS%20%27ada361260%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada361260%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9303430461829)

Abstract: This report describes a human factors evaluation of the target prosecution benefits of integrated enhanced synthetic aperture radar (ESAR) and automatic target recognition (ATR) technologies. Workstation operators aboard E-8C Joint Surveillance Target Attack Radar System (JSTARS) aircraft field-tested integrated ATR information and ESAR imagery during performance of mobile missile launcher targeting tasks on a series of demonstration flights. Two methods of data collection were used: post-flight questionnaires collected subjective operator assessments, and a human factors engineer conducted in-flight observation. The evaluative goal was to assess operator acceptance and to establish guidelines for the integration of ATR and ESAR capabilities on the JSTARS. Results included significantly positive ratings for increase in situation awareness, somewhat decreased or unchanged ratings for workload, and no reports of increase in visual fatigue. Three of four operators recommended the incorporation of an integrated ATR/ESAR imagery capability into the JSTARS graphic display. Operators also requested inclusion of ATR numeric confidence ratings and that display of ATR information be optional. Human factors design recommendations cited existing military standards and human factors industry guidelines for improved displays and display interfaces.

### **The Hypervelocity EML Program**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA338979&searchterms=%28ADNUMBER%20CONTAINS%20%27ada338979%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada338979%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057126813359](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA338979&searchterms=%28ADNUMBER%20CONTAINS%20%27ada338979%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada338979%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057126813359)

Abstract: The briefing included a description of the capabilities of hypervelocity guns potential missions for HVGs, recent HVG TMD studies, D-2 projectiles, and technology support.

### **The Impact of the JFACC and AADC on the Joint Force Commander's Flexibility in Joint Theater Air and Missile Defense**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA349262&searchterms=%28ADNUMBER%20CONTAINS%20%27ada349262%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada349262%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057145514529](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA349262&searchterms=%28ADNUMBER%20CONTAINS%20%27ada349262%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada349262%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057145514529)

Abstract: As a growing area of warfare, Joint Theater Air and Missile Defense (JTAMD) presents an environment that challenges the U.S. military to achieve unprecedented levels of force integration. As the ballistic and cruise missile threat continues to expand and include weapons of mass destruction, the Joint Force Commander must employ a force package capable of succeeding in any theater, regardless of its maturity level. Joint doctrine, and the roles and missions of the Joint Force Air Component Commander (JFACC) and Area Air Defense Commander (AADC), play an integral part in his ability to execute JTAMD effectively and efficiently. The JFACC and AADC currently inhibit force effectiveness through disparities and overlap of missions, as well as frequent dual and triple hatting functional and service component commands. Resultant problems include inappropriate apportionment of resources, lack of focus on the objective, and inadequate staffing at the functional component command. All of these problems degrade force integration and reduce both effectiveness and efficiency. Solving these problems, primarily through more specific joint doctrine that provides distinct roles for the JFACC and AADC, will produce defense in depth, unity of effort and economy of force.

### **Japan's Nuclear Weapons Options and U.S. Security Interests**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA349589&searchterms=%28ADNUMBER%20CONTAINS%20%27ada349589%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada349589%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057314723200](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA349589&searchterms=%28ADNUMBER%20CONTAINS%20%27ada349589%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada349589%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057314723200)

Abstract: Japan is a virtual nuclear weapons power. It has the scientific and technical ability to produce hundreds or even thousands of nuclear weapons, but has chosen not to do so for political reasons. This thesis examines the historical development of Japan's nuclear energy and aerospace programs since the mid-1950s and considers the possibility that at various points in its history, Japan used these programs as a cover to insure that its nuclear weapons options remained open. This thesis analyzes internal and external factors that may have influenced Japan's nuclear policies. External factors include regional threats, international pressures to join the Non- Proliferation Treaty, and distrust of U.S. commitments to provide for Japan's defense. Internal factors include Japan's historical tradition of a strong military state and Japan's unique nuclear allergy. While both external and internal factors have influenced the path of Japan's nuclear energy and aerospace programs, internal factors will drive Japan to maintain its plutonium-based energy program and will allow Japan to remain a virtual nuclear power well into the twenty-first century.

### **Joint Theater Missile Defense Interoperability**

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Abstract: Global proliferation of Weapons of Mass Destruction is directly tied to the rapid development of Theater Ballistic Missiles (TBMs) as both a political and military weapon of choice in developing nations. As such, the U.S. Joint Forces Commander (JFC) is faced with the issue of optimizing own-force Theater Missile Defense (TMD) assets as well as those of Coalition partners. Underpinning the issue of TMD resource allocation and employment are the issues of interoperability and integration of Joint Force, i.e., service component unique, Battle Management/Command, Control and Communications (BM/C3) systems into an information architecture that supports TMD. The problem of TMD BM/C3 interoperability is aggravated in coalition or multi-national warfare, where all TMD players do not have equal access to information. BM/C3 Tactical Data Processors (TDPs) have embedded data correlation or data fusion algorithms as the "brain" of the system used to develop a common picture of the battlespace. These data correlation algorithms may take the form of mathematical equations, "IF -THEN" statements or logical rules. The differences between data correlation algorithms is reflected as differences in the common picture displayed in a BM/C3 system among the various TMD players and the JFC. In order to improve multi-service and multi-national interoperability in the near term, the JFC commander may selectively alter the information architecture within a specific theater to optimize data correlation and better develop a single, common picture of the battlespace. In the long term, the JFC must advocate the joint acquisition of BM/C3 systems that not only "look alike," but "think alike."

### **Major Theater Warfare: Still Relevant Through 2010**

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Abstract: This report defines and then analyzes the merit of the nation's present policy concerning the conduct of Major Theater War. Using the nation's interests and the elements of power available to achieve those interests as background, it establishes that our present policy requiring the capability to execute two, nearly simultaneous, Major Theater Wars remains relevant for the near future. This conclusion is reached after first discussing the basis of the policy, and then refuting many of the arguments that criticize our policy concerning Major Theater War.

### **Multi-Dimensional Analysis of TMD Lethality Data**

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Abstract: PEELS (Parametric Endo Exoatmospheric Lethality Simulation) calculations involve lethality determinations that typically include more than two parameters. A method of interpreting such multi-dimensional lethality results is presented using multiple regression techniques. A PEELS body to body calculation was run where the relative velocity, the strike angle, the impact point, and the overall density and length to diameter ratio of a cylindrical kill vehicle were varied. The mass of the kill vehicle was set at 15 kilograms and the threat was the unclassified PEELS TBMCS5 (STORM) target vehicle with a payload of 38 chemical submunitions. The parameters were considered to predict the lethality from hits, Pk/h, as polynomial factors in a regression equation. The resulting multiplication results in a very large number of terms that contain, as products, every combination of the variables in the factors. A number of reduced regression equations were set up that included the original parameters as well as a few of the cross terms. These equations were then subjected to multiple linear regression to examine the significance of the variable terms. Additional regression equations were set up to examine the specific functional relationship of one or two parameters (linear and quadratic) to the lethality. One of the unexpected results was, for this configuration, that the lethality was not a strong function of the relative velocity and the most effective kill vehicle had the lowest density and hardness.

### **NMD Program Update to AIAA/BMDO Technology Readiness Conference**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA355979&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355979%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355979%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057370726549](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA355979&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355979%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355979%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057370726549)

Abstract: The purpose of this report is to provide overview of the ongoing National Missile Defense Program to the AIAA/BMDO Technology Readiness Conference.

### **National Missile Defense (NMD) Test Program**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA355746&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355746%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355746%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057383327681](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA355746&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355746%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355746%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057383327681)

Abstract: This paper describes the challenging task of testing the most complex, expensive, technically evolving, and politically sensitive missile system to be developed to date. The National Missile Defense (NMD) System comprises radars, interceptors, space based sensors, and battle management, command, control, and communications (BMC3) elements. While the integration of these many complex elements into a functional system is no small achievement, the

performance verification of this system is an equally challenging task. This paper describes the test components of the NMD test program, their importance to the test program, relationships among the components, and their contributions to NMD test and evaluation which form the basis for the System Engineer to evaluate and verify NMD System performance.

## **The Nuclear-Armed Tomahawk Cruise Missile: Its Potential Utility on United States and United Kingdom Attack Submarines**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA359545&searchterms=%28ADNUMBER%20CONTAINS%20%27ada359545%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada359545%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93058772523351](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA359545&searchterms=%28ADNUMBER%20CONTAINS%20%27ada359545%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada359545%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93058772523351)

**Abstract:** In July 1998, Britain published its Strategic Defense Review(SDR). The SDR outlined significant changes for Britain's nuclear weapons program and formalized the policy of sub-strategic deterrence using the Trident missile. It is unprecedented for a nuclear power to have consolidated its strategic and sub- strategic nuclear forces into a single system. The benefits offered by the British choice might be enjoyed for only a short time. The British have slashed their nuclear forces and eliminated the range of options previously available to their national command authority. Dependence on a single delivery system could result in the inability to respond to crises, to act autonomously, or to negotiate effectively with other nuclear weapon states. This thesis analyzes the benefits that nuclear Tomahawk could provide the British. Since the United States owns the system, the future of the nuclear Tomahawk in the American arsenal is crucial to any British decision to adopt it or a similar system. An unmanned nuclear cruise missile weapon offers many advantages in today's security environment. The United States should retain nuclear Tomahawk and Britain, with its mature maritime force, should consider acquiring a similar capability. The elimination of nuclear Tomahawk from the U.S. arsenal would be a mistake.

## **Nuclear Attack on U.S. Space-Based Assets: Current Strategy, Policy, Reality, and Implications for the Future**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA350085&searchterms=%28ADNUMBER%20CONTAINS%20%27ada350085%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada350085%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93058809225997](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA350085&searchterms=%28ADNUMBER%20CONTAINS%20%27ada350085%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada350085%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93058809225997)

**Abstract:** This study examines what changes need to be made in U.S. strategy, policy, and programs in order to prevent a nuclear attack on its space-based assets. The study was inspired by an event, which occurred during the Army After Next Winter Wargame conducted at Carlisle Barracks, Pennsylvania, in the winter of 1997. Although this attack took place in a wargame set in the year 2020, the threat is relevant today. As the proliferation of nuclear weapons continues, the possibility of a rogue nation using a nuclear weapon as what has been called the "cheapest form of ASAT" (Anti-satellite Weapon) is a contingency that the political and military leaders of the U.S.

cannot dismiss. This study will review the technical aspects of the use of nuclear weapons in space, deterrence, strategy, and policy issues that affect such an attack. Finally, this thesis will identify the gaps in U.S. strategy and policy and demonstrate how these same gaps potentially leave the U.S. vulnerable to this form of attack in the present time frame. It concludes that the nation cannot currently prevent a nuclear attack on its space-based assets, the best it can achieve is to attempt to deter such an attack and limit the effects should deterrence fail. It proposes what is needed to augment the mission of space.

## **Nuclear Deterrent Cooperation Involving Britain, France, and Germany**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA359133&searchterms=%28ADNUMBER%20CONTAINS%20%27ada359133%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada359133%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057394828286](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA359133&searchterms=%28ADNUMBER%20CONTAINS%20%27ada359133%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada359133%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057394828286)

**Abstract:** To construct a political union with an autonomous Common Foreign and Security Policy (CFSP), the European Union (EU) must "sooner or later" address the integration of the British and French deterrents within a credible West European nuclear consultation arrangement. However, there exists little consensus among Britain, France, and Germany on the creation of a European Security and Defense Identity (ESDI), much less the "course and speed" of integration within the EU. Indeed, the "conflict and contrast" of national interests have been most conspicuous when discussions at the highest levels have turned towards creating a combined European nuclear posture through the coordination of the British and French nuclear forces. Without a "Eurodeterrent," an autonomous CFSP for the EU would be impractical due to NATO Europe's continued reliance on US nuclear guarantees. However, if an autonomous CFSP were realized, the EU's combined nuclear posture would have significant implications for the United States and the Atlantic Alliance. Due to the complexity of the issues involved in the creation of a multinational European nuclear doctrine and deterrent, the creation of a "Eurodeterrent" should be considered the "anchorman" vice the "pacesetter" within the development of the EU's Common Foreign and Security Policy.

## **Nuclear Operations Air Force Doctrine Document 2-1.5**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA356439&searchterms=%28ADNUMBER%20CONTAINS%20%27ada356439%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada356439%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93059467129673](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA356439&searchterms=%28ADNUMBER%20CONTAINS%20%27ada356439%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada356439%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93059467129673)

**Abstract:** This doctrine provides guidance for Air Force nuclear operations. This guidance is based on a body of knowledge gained from experience in organizing, training, and equipping nuclear forces in support of national security objectives. The focus of the Air Force role in nuclear operations is to maintain effective forces with sufficient capability to hold at risk a broad range of targets, while placing great emphasis on safety and security. Achieving such a purpose in

today's environment requires both an in-depth understanding of the modern world and a useful doctrine based on over 50 years of nuclear operations. Despite the end of the cold war, the nuclear threat to the United States has not ended. Russia continues to maintain a formidable nuclear capability, and other nations such as China maintain intercontinental and theater-range weapons as well. While the direct threat to the United States may be limited, it is conceivable that a nuclear confrontation between other nations might involve the United States. Much as the end of the cold war was unexpected, new threats could appear without warning. New governments could conceivably change the course of a country's development in such a fashion as to lead to another cold war. Tensions between the United States and other countries could increase to the point where a strong deterrent is required. Other strategic threats, not even imagined today, could develop in the years to come. The United States cannot afford to ignore its nuclear doctrine, allowing it to sit on the shelf until another threat arises; doctrine must be "living" if it is to be effective. Nuclear deterrence is not limited to the threat of attack against the United States.

## **Nuclear Weapons and NATO-Russia Relations**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA359768&searchterms=%28ADNUMBER%20CONTAINS%20%27ada359768%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada359768%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057403528701](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA359768&searchterms=%28ADNUMBER%20CONTAINS%20%27ada359768%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada359768%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057403528701)

Abstract: Despite the development of positive institutional arrangements such as Russian participation in the NATO-led peacekeeping force in Bosnia and the NATO-Russia Permanent Joint Council, the strategic culture of Russia has not changed in any fundamental sense. Russian strategic culture has not evolved in ways that would make Russian policies compatible with those of NATO countries in the necessary economic, social, technological, and military spheres. On the domestic side, Russia has yet to establish a stable democracy and the necessary legal, judicial, and regulatory institutions for a free-market economy. Russia evidently lacks the necessary cultural traditions, including concepts of accountability and transparency, to make these adaptations in the short-term. Owing in part to its institutional shortcomings, severe socioeconomic setbacks have afflicted Russia. Russian conventional military strength has been weakened, and a concomitant reliance by the Russians on nuclear weapons as their ultimate line of defense has increased. The breakdown in the infrastructure that supports Russian early warning and surveillance systems and nuclear weapons stewardship defense, coupled with a tendency towards has exacerbated Russian anxiety and distrust toward NATO. Russia's reliance on nuclear weapons as the ultimate line of defense, coupled with a tendency toward suspicion and distrust toward NATO, could lead to dangerous strategic miscalculation and nuclear catastrophe.

## **Overcoming the ABM Treaty: Paths to National Missile Defense**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA354663&searchterms=%28ADNUMBER%20CONTAINS%20%27ada354663%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada354663%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057415729767](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA354663&searchterms=%28ADNUMBER%20CONTAINS%20%27ada354663%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada354663%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057415729767)

Abstract: Some of the most heated debates taking place on Capitol Hill surround a proposed American national missile defense system. The debate is not new. For twenty years, the Anti-Ballistic Missile (ABM) Treaty and its underlying acceptance of mutual assured destruction (MAD) enjoyed widespread support among U.S. leaders. Events of the early 1990s shook support for America's "no missile defense" posture to its very core. The fall of the Soviet Union, the proliferation of weapons of mass destruction (WMD) and ballistic missile technology, and the Gulf War presented new challenges to existing strategic doctrine. As a result, a renewed push for a U.S. National Missile Defense (NMD) system began in earnest, and a new round of debates began over the utility of the bilateral ABM Treaty in a multilateral post-Cold War international environment. This thesis identifies four distinct paths which the United States could follow in addressing the NMD-ABM Treaty debate. Each path is characterized by distinct factors which historically have influenced past ABM system debates. The most likely path to NMD that the United States is following, based on these driving factors, is identified. The potential implications which this prevalent NMD path may have on U.S. Navy force structure and planning is also addressed. Understanding how the current NMD debate is structured and driven enables one to discern which path to NMD deployment the United States is on. This realization can help shape future force planning considerations.

### **Report of the Defense Science Board Task Force on Nuclear Deterrence**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA358406&searchterms=%28ADNUMBER%20CONTAINS%20%27ada358406%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada358406%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=930574281339](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA358406&searchterms=%28ADNUMBER%20CONTAINS%20%27ada358406%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada358406%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=930574281339)

Abstract: This report examines potential measures that DOD should take to sustain nuclear forces, nuclear weapons capabilities, and supporting infrastructure. The Terms of Reference specified that emphasis be placed on (1) Sustaining nuclear weapons stockpile and developing needed capabilities, including delivery system capabilities, in light of arms control agreements, (2) the adequacy of the DOE Stockpile Stewardship for meeting: fixture DOD requirements, (3) the adequacy of the nuclear technical base, (4) fixture industrial base capability for nuclear deterrent forces and weapons, (5) options for future nuclear deterrent forces and stockpile, acquisition strategies, R&D timelines, manufacturing and production capabilities, common systems and/or subsystems. The report includes a number of specific recommendations in each of six key areas.

### **Roadmap for the Ballistic Missile Defense Organization Ground Test Facilities**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA355813&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355813%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355813%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9305744251556](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA355813&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355813%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355813%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9305744251556)

Abstract: The Ballistic Missile Defense Program is structured to respond to existing and emerging ballistic missile threats to the United States, its forward deployed forces, allies, and friends around the world. The highest priority is Theater Missile Defense (TMD), followed by National Missile Defense (NMD), and finally investment in BMD advanced technologies.

## **Security Implications of the Proliferation of Weapons of Mass Destruction in the Middle East**

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Abstract: The author argues that the Arab-Israeli conflict, the Iran-Iraq rivalry, and the lack of progress in the peace process are strong incentives for nations in the region to acquire weapons of mass destruction (WMD). He documents Israeli, Iranian, and Arab WMD programs and capabilities, referencing use of WMD in the region. He discusses the reasons why the major regional powers seek WMD capabilities and examines the nature of the proliferation dynamic as well as nonproliferation and counterproliferation approaches applicable to the region. The author offers several recommendations designed to strengthen these efforts and deal more effectively with causes of proliferation.

## **Solid Divert Breakthroughs that Enable Mission Flexible TMD Interceptors**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA355946&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355946%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355946%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057778723796](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA355946&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355946%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355946%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057778723796)

Abstract: This paper describes technology breakthroughs in solid divert propulsion that provide extensive mission flexibility to theater missile defense (TMD) interceptors over previous solid propellant divert systems. TMD interceptors must cover large battlespaces to minimize the total number of launchers and deployed missiles. They must defend against a broad set of targets, from short to long ranges. Effectiveness against current and emerging TMD targets is ensured when a fully controllable Divert and Attitude Control System (DACS) is used to maneuver the interceptor to impact. Operational requirements demand this DACS use solid propellant for user safety and cost minimization. Aerojet has recently accomplished several technology breakthroughs which demonstrate a solid DACS can be built with the mission flexibility of a liquid. This DACS called EXCELS (Endo, eXo, Controllable, Extinguishable, Lightweight, Solid), is the industry's first truly controllable solid DACS. Aerojet's EXCELS DACS has been under development since 1991 with IR&D funding. Since then, four key development tests have been performed that validate the technology. Results are summarized in this paper. Aerojet is now supporting the BMDO, Navy and Army with contracts to further develop the EXCELS DACS for the SM-3 Block 2 Risk Reduction effort and the Atmospheric Interceptor Program (AIT). DACS development progress made on

these programs in Winter and Spring 1998 are included in this paper.

### **Some Potential Risks at Lower Levels of Strategic Nuclear Weapon Arsenals**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA348992&searchterms=%28ADNUMBER%20CONTAINS%20%27ada348992%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada348992%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057798924964](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA348992&searchterms=%28ADNUMBER%20CONTAINS%20%27ada348992%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada348992%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93057798924964)

Abstract: An examination of the some of the risks if both the U.S. and Russia were to reduce their strategic nuclear inventories in future arms control environments. The risks considered include: (1) loss of deterrence, (2) launch on warning, and (3) breakout or cheating. Assumed weapon limits for both sides included START 3 and a limit of 800 warheads on each side.

### **Strategic Deterrence in the 21st Century**

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Abstract: The roll of strategic command in making the global engagement vision a reality can seem vague and on the periphery. Exactly the opposite is true. Our mission was essential in the past and is crucial today as we embrace the global engagement concept. Nuclear deterrence is at the core of American national security strategy. Joint Vision 2010 defines the primary task of our Armed Forces to deter conflict, but should deterrence fail, to fight and to win. This is what we do at Strategic Command: deterrence. It is what we do each and every day, 24 hours a day, 365 days a year. Why we are still in the deterrence business? The Cold War has ended. Why do we still need a deterrent force? When the Cold War ended, it didn't end with parades and banner headlines. It ended with a fizzle; the loser really didn't lose in the traditional sense. When the Cold War ended, the loser retained its arsenal, including several thousands of nuclear warheads on alert. Because the Cold War ended in such an ambiguous manner, it has been hard to make our message heard--our message is that we still need to be around. When we fought World War II, 18 months after Pearl Harbor General Marshall had a group in the War Department looking at a post-World War II world. The end of the Cold War snuck up on us and we have been paying the price ever since. Clearly the world has changed a great deal in the last decade. It is a safer world. Through all this change, one thing remains constant and that is our unwavering emphasis and focus on deterrence.

### **Strategic Frontier: American Bomber Bases Overseas, 1950-1960**

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Abstract: On the morning of 16 January 1991, the eve of the Gulf War, seven SAC bombers took off from Barksdale Air Force Base in Louisiana, laden with weapons for use against Iraq. After fifteen hours of flight, which included two hours of air refueling by each plane, they arrived at launch points in northern Saudi Arabia and released thirty-five cruise missiles at eight target complexes in the Mosul area, then returned to the United States. This flight lasted over thirty-five hours and covered fourteen thousand miles--the longest time and farthest distance of any combat mission in aviation history.' This was also the first wartime demonstration of an ideal sought by American leaders since before World War II and proclaimed by Air Force leaders since the late 1950s: the intercontinental reach of aerial platforms. Strategic weapons based in the United States attacked a distant enemy nation, seemingly without the many political, economic, social, and military encumbrances of overseas bases. But bases beyond North America were used for support of this mission; the bombers were refueled by a fleet of fifty-seven aerial tankers from bases in Spain and the Azores. Even today, at the end of aviation's first century, if aircraft are the intercontinental weapons of choice, bases beyond national borders are still required. This dissertation presents an analysis of a specific type of American military base used during the 1950s, namely overseas bomber bases controlled by the Strategic Air Command (SAC). These facilities were unique, by mission and command lines, and were pivotal to the national security strategy of the United States during a critical period of the Cold War.

### **THAAD Hardware-in-the-Loop Signal Injection Hardware Technical Description**

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Abstract: This report provides background information on the Theater High Altitude Air Defense (THAAD) Missile System and a technical description of a signal injection card built for the THAAD Hardware in the Loop (HWIL) Missile Simulation located in the Imaging Infrared System Simulation 2 (IRSS2) Facility of U.S. Army Aviation and Missile Command's (USAMCOM's) Advanced Simulation Center (ASC). The Signal Injection Card gives the THAAD HWIL missile simulation the capability to test the missile's Integrated Avionics Package (IAP) in a closed loop HWIL IAP only missile simulation with a simulated Infrared (IR) seeker. Schematics and timing diagrams are included to aid in the technical description of the signal injection card.

### **Theater Missile Defense**

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Abstract: The proliferation of missile and WMD technologies around the world makes effective TMD a critical prerequisite for successful joint operations. The mere presence of hostile theater missile capabilities in an operational area, especially if they pose a WMD threat, creates a significant challenge for the operational commander. Future CINCs will have no choice but to plan for Theater Missile Defense if they are operating in an area equipped with theater missiles. A single service can not do it alone; it must be joint to succeed. Each service is developing useful active defense systems that, individually do not provide the total solution. We must find a way to integrate these systems into a coherent whole to counter the growing TM threat.

### **Theater Missile Defense: Does the Quadrennial Defense Review Go Far Enough in Support of the Operational Commander?**

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Abstract: In May of 1997, the Secretary of Defense released the results of the Quadrennial Defense Review (QDR) establishing the Department of Defense's force structure and modernization program requirements designed to meet the challenges of the 21st century while ensuring current readiness. Included in this report were the continuation of numerous programs designed to provide a theater missile defense (TMD) system. The Gulf War demonstrated the difficulties of preventing and defending against the use of ballistic missiles launched at U.S. and allied deployed forces. Further, the continued proliferation of nuclear, biological and chemical weapons and the associated delivery technologies are an increasing threat to deployed operations. These threats could effectively deter U.S. foreign policy and out of area operations in regions considered vital to national security. This paper will examine the approach of the QDR with respect to TMD programs, and ask the question, does the QDR go far enough in support of the Operational Commander? Specific recommendations are offered to demonstrate how the QDR could have more fully committed to TMD, countering the threat of WMD in regional conflicts.

### **Theater Missile Defense in World War II - Some Operational Art Considerations**

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Abstract: The World War II V-1 and V-2 attacks by Germany were the first effective use of theater

missiles, and the first instance of a requirement for theater missile defense (TMD). The Allied response to German cruise (V-1) and ballistic (V-2) missile attacks incorporated all the elements of modern TMD concepts--Active Defense; Passive Defense; Attack Operations; and Command, Control, Communications, Computers, and Intelligence (C4I)--with varying success. Examining this historical case from the perspective of the three basic operational art factors-- Space, Time, and Force--and their interrelationships provides some considerations for the operational commander planning and conducting TMD today. Theater missiles will remain a desirable weapon system from an enemy's perspective. Unlike the Second World War, modern conflicts are likely to be short and both sides will essentially "come as they are." The various improvements in theater missile capabilities, coupled with their wider proliferation, will challenge the operational commander even more than before. Nevertheless, improving TMD capabilities will help the operational commander counter the threat. At the same time, coalition partners and host nations will continue to place additional demands on the operational commander. The continued development of TMD doctrine, coupled with improving capabilities and realistic training, should permit an effective TMD response in future conflicts.

### **To Find and Not to Yield. How Advances in Information and Firepower Can Transform Theater Warfare**

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Abstract: The military forces of the United States are on the threshold of fielding new capabilities that, in concert, represent a revolutionary transformation in the ability to prosecute large scale theater warfare. These capabilities, if fully exploited, can allow comparatively small numbers of forces to observe, assess, engage, and effectively attack enemy assets especially moving land, sea, and air forces over a large area. These new capabilities are thus well suited to meeting the needs of a demanding U.S. defense strategy that calls for forces that can rapidly project military power over long distances, apply that power in a discriminate fashion, and achieve highly asymmetric, favorable outcomes. This report does not argue that the nation should be spending more on defense. It does argue that the Department of Defense should reexamine its force mix and investment priorities in order to exploit more fully and more rapidly important opportunities that exist to enhance U.S. capabilities for rapid power projection. The analysis set forth here should be useful to anyone with a serious interest in U.S. national security and defense planning, particularly those interested in capabilities needed to deter and to prevail in major theater conflicts.

### **U.S. Strategic Nuclear Forces in the Post Strategic Arms Reduction Talk World: Is There a Future for Nuclear Deterrence?**

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Abstract: Following victory in the Cold War, the Soviet threat that shaped United States' nuclear deterrent strategy for the past 40 years is gone. That defined, monolithic threat has been replaced by a diverse array of new challenges including proliferation of nuclear, chemical and biological Weapons of Mass Destruction (WMD) among regional powers, rogue states and non-state actors. In the face of this emerging WMD threat, the United States is dismantling its chemical and biological weapons stockpile and remains committed to further reductions in its nuclear arsenal. Can a reduced U.S. nuclear weapons arsenal provide a credible deterrent to the growing threat posed by proliferation of WMD? Finally, in light of the current Revolution in Military Affairs (RMA), is it time to reduce our dependence on nuclear weapons and pursue other deterrent options?

### **United States European Command Theater Missile Defense Coordination Cell**

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Abstract: This study analyzes the centralized operations and intelligence fusion functions in an equipment system known as the United States European Command's Theater Missile Defense Coordination Cell. Under the Ballistic Missile Defense Organization Commander in Chief Assessment Program, U.S. European Command developed the Theater Missile Defense Coordination Cell to help in the fusion of centralized operations and intelligence information. The Theater Missile Defense Coordination Cell facilitates the activities of Passive Defense, Active Defense, Attack Operations, and the C4I that integrates procedures, voice and data communications, processing equipment, as well as supporting intelligence and targeting. This study examines U.S. European Command's Theater Missile Defense Coordination Cell to answer the primary question: Is the U.S. European Command Theater Missile Defense Coordination Cell an important vehicle to exploit new technologies in countering the theater ballistic missile threat? The study concludes that no single service or nation possesses all the necessary assets to counter the theater ballistic missile threat. The Theater Missile Defense Coordination Cell and the funding program from Ballistic Missile Defense Organization Commander in Chief Assessment Program provide a valuable vehicle to test and leverage new technologies in countering the theater missile threat.

### **Weapons of Mass Destruction a Network-Centered Threat**

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Abstract: Battlespace dominance is more than the physical control of air, land, and sea. Under the network centric concept of operations, U.S. forces must be ready to control the infosphere in order to assure military objectives can be achieved. Perhaps the most effective information warfare (IW) weapon is a Weapon of Mass Destruction (WMD), specifically a biological or nuclear weapon. Important questions should be answered about the ability to protect American information networks from the significant information disruption characteristics of WMD.

## **U.S. Military Strategy and Technology**

### **Battlefield of the Future: 21st Century Warfare Issues**

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Abstract: This is a book about strategy and war fighting in the midst of a revolution in military affairs as the world moves into the twenty-first century. Its 11 essays examine topics such as military operations against a well-armed rogue state or NASTI (NBC-arming sponsor of terrorism and intervention) state; the potential of parallel warfare strategy for different kinds of states; the revolutionary potential of information warfare; the lethal possibilities of biological warfare; and the elements of an ongoing revolution in military affairs (RMA). The book's purpose is to focus attention on the operational problems, enemy strategies, and threats that will confront US national security decision makers in the twenty-first century. The participating authors are either professional military officers or civilian professionals who specialize in national security Issues. Two of the architects of the US air campaign in the 1991 Gulf War have contributed essays that discuss the evolving utility of air power to achieve decisive results and the lessons that might portend for the future of warfare.

### **Beyond Horizons: A Half Century of Air Force Space Leadership. Revised Edition**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA355572&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355572%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355572%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9305856487172](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA355572&searchterms=%28ADNUMBER%20CONTAINS%20%27ada355572%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada355572%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9305856487172)

Abstract: Beyond Horizons: A Half Century of Air Force Space Leadership is a study of the

United States Air Force in space. Of all the military services, the Air Force has been preeminently involved for the past fifty years in initiating, developing, and applying the technology of space-based systems in support of the nation's national security. Yet there has been no single-volume overview of the Air Force space story to serve as an introduction and guide for interested readers. In November 1992, a high-level Air Force Blue Ribbon Panel on Space, chaired by then Lieutenant General Thomas S. Moorman, Jr., commander of Air Force Space Command, concluded there was a specific need to better educate people, both in the service and among the general populace, about the history of Air Force space activities. Beyond Horizons has been written to meet this need.

### **A Comparative Analysis of Land-Based Antisubmarine Warfare Operations in the Atlantic: U.S. Army During World War II and the U.S. Navy During the Cold War**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA350031&searchterms=%28ADNUMBER%20CONTAINS%20%27ada350031%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada350031%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9305859089135](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA350031&searchterms=%28ADNUMBER%20CONTAINS%20%27ada350031%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada350031%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9305859089135)

**Abstract:** This study examines a comparison of land based antisubmarine warfare (ASW) operations using U.S. Army aircraft during World War 2 and the U.S. Navy's P-3 Orion during the Cold War. Through both wars, land based ASW aircraft provided the U.S. military an outreaching arm that limited the striking potential of enemy submarines. This thesis investigates the comparison in more depth by using four of the nine principles of war: (1) objective, (2) offensive, (3) maneuver, and (4) surprise. Deterrence was the national strategy used to keep submarines from becoming a potential aggressor during both wars. The Navy's P-3 Orion, land based throughout the Atlantic, was able to provide a credible deterrent against Soviet submarines since its introduction to the fleet in 1962. U.S. Army aircraft of World War 2 used in fighting the German U-boats, on the other hand, progressed into a credible deterrent in their temporary role of ASW. The author examines the short lived history of U.S. Army land based operations (approximately two years) and the extended history of the U.S. Navy land based operations and suggests that despite technological advances onboard both service's aircraft, land based ASW has changed very little after fifty years. This study also indicates that there lies a significant need in pursuing and continuing the capabilities of a land based ASW aircraft.

### **Crime, Terror and War: National Security and Public Safety in the Information Age**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA359747&searchterms=%28ADNUMBER%20CONTAINS%20%27ada359747%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada359747%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9305861511147](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA359747&searchterms=%28ADNUMBER%20CONTAINS%20%27ada359747%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada359747%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9305861511147)

**Abstract:** During the Cold War, the source and nature of threats to the United States were well understood. The Soviet strategic nuclear threat ordered American defense and intelligence

planning. The offensive posture of the Warsaw Pact and Soviet regional subversion were answered by the strength of the NATO alliance and the determination of the Reagan Doctrine, and a US. military that was designed and ready for force projection anywhere in the world. There were more lives lost in hostilities during this so-called Cold War than at any comparable period in history. But for the most part, Americans felt safe at home. We lived with the horrible threat of mutual assured destruction for decades, before public opinion and Presidential leadership resisted upon real strategic defense (a goal that remains politically elusive even today. At the same time, civil defense, a common part of state and local planning in the 1950s, gradually became relegated to dusty contingency plans and late night TV jokes. Bomb shelters became wine cellars. The military did not train to defend our shores, because there was no enemy poised to attack. Today, however, the assumption that we Americans can rest in our island nation secure from foreign threats is not so comfortably obvious. It no longer takes a superpower to threaten the American homeland, as the spread of technology, especially weapons technologies has lowered the threshold for what is needed to do serious harm. The 1998 Rumsfeld Commission report on the ballistic missile threat to the United States points out that lesser nations are developing capabilities to launch ballistic missiles that can reach Americans at home. Many terrorist groups have a newfound interest in weapons that can cause a great number of casualties, such as biological and chemical weapons, and more sweeping social objectives for their terrorist campaigns.

### **Defense Technology Objectives for the Joint Warfighting Science and Technology Plan and the Defense Technology Area Plan**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA337503&searchterms=%28ADNUMBER%20CONTAINS%20%27ada337503%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada337503%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93058658914342](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA337503&searchterms=%28ADNUMBER%20CONTAINS%20%27ada337503%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada337503%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93058658914342)

Abstract: Technological superiority has been and continues to be a cornerstone of our national military strategy. Technologies such as radar, jet engines, nuclear weapons, night vision, smart weapons, stealth, the Global Positioning System, and vastly more capable information management systems have changed warfare dramatically. Today's technological edge allows us to prevail across the broad spectrum of conflict decisively and with relatively low casualties. Maintaining this technological edge has become even more important as the size of U.S. forces decreases and high-technology weapons are now readily available on the world market. In this new environment, it is imperative that U. S. forces possess technological superiority to achieve and maintain the dominance displayed in Operation Desert Storm. The technological advantage we enjoy today is a legacy of decades of investment in science and technology (S&T) . Likewise, our future warfighting capabilities will be substantially determined by today's investment in S&T.

### **Domestic Terrorism and Our National Security Strategy**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA341465&searchterms=%28ADNUMBER%20](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA341465&searchterms=%28ADNUMBER%20)



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Abstract: The threat of terrorism has encroached our national borders and has created a heightened sense of vulnerability among many Americans. President Clinton has stated, "Fighting terrorism is and will for a long time to come be one of the top priorities of the United States." Two acts passed in 1996 have strengthened our fight against terrorism, the Antiterrorism and Effective Death Penalty Act and the Defense Against Weapons of Mass Destruction (WMD) Act. The Defense Against WMD Act designated the Department of Defense the executive agent for coordination of assistance in responding to threats involving biological and chemical weapons. The focus of this research project will be to follow this trail and analyze DOD's course of action in meeting their obligation and assess the probability that DOD will maintain this function after the 1 October 1999 legislative mandate.

### **Embracing the Bomb: Ethics, Morality, and Nuclear Deterrence in the U.S. Air Force, 1945-1955**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA350706&searchterms=%28ADNUMBER%20CONTAINS%20%27ada350706%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada350706%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9305955166917](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA350706&searchterms=%28ADNUMBER%20CONTAINS%20%27ada350706%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada350706%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9305955166917)

Abstract: For four years, from 1945-1949, the U.S. Air Force was the only institution on the planet responsible for planning nuclear strikes and capable of delivering such a blow. Even in the mid-1950s, the Air Force was still by far the most powerful nuclear force and would be for years. At the same time, an intense moral debate surrounded atomic and nuclear weapons. This paper addresses how leading U.S. Air Force officers viewed nuclear weapons in ethical terms. Specifically, at a time when no one else had to, how and why did professional Air Force officers come to accept planning for, threatening, and training to take millions upon millions of human lives, many of them civilian, with nuclear weapons? The work draws extensively from the manuscript collections and printed primary sources of Air Force generals to show that these men ardently believed they were traveling the road of higher morality.

### **Estimated Budgetary Impacts of Alternative Levels of Strategic Forces**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA347170&searchterms=%28ADNUMBER%20CONTAINS%20%27ada347170%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada347170%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93058699817822](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA347170&searchterms=%28ADNUMBER%20CONTAINS%20%27ada347170%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada347170%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93058699817822)

Abstract: The Congressional Budget Office has estimated the budgetary impacts of four scenarios

for strategic forces. Those scenarios would maintain U.S. strategic forces at a level of 6,000 warheads, lower warhead levels to 3,500 by 2003, and make further reductions to 2,500 warheads and 1,000 warheads. The enclosure discusses the budgetary impact of the alternatives over the next 10 years and in the long run. CBO will address the request for estimates of the budgetary impact and security issues associated with other approaches to arms control in a forthcoming analysis. Those approaches would include placing all non-deployed warheads and weapons-grade materials in secure storage facilities and reducing the alert status of some or all of the nuclear forces.

## **Joint Warfighting Science and Technology Plan**

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Abstract: Technological superiority has been, and continues to be, a cornerstone of our national military strategy. Technologies such as radar, jet engines, nuclear weapons, night vision, smart weapons, stealth, the Global Positioning System, and vastly more capable information management systems have changed warfare dramatically. Today's technological edge allows us to prevail across the broad spectrum of conflict decisively and with relatively low casualties. Maintaining this technological edge has become even more important as the size of U.S. forces decreases and high-technology weapons are now readily available on the world market. In this new environment, it is imperative that U. S. forces possess technological superiority to achieve and maintain the dominance displayed in Operation Desert Storm. The technological advantage we enjoy today is a legacy of decades of investment in science and technology (S&T) . Likewise, our future warfighting capabilities will be substantially determined by today's investment in S&T.

## **Security Assistance, a Viable Means in Building Coalitions and Providing for Our National Security**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA346377&searchterms=%28ADNUMBER%20CONTAINS%20%27ada346377%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada346377%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93059611111713](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA346377&searchterms=%28ADNUMBER%20CONTAINS%20%27ada346377%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada346377%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=93059611111713)

Abstract: In a time when the threat of global conflict is at an unprecedented low and opportunities are boundless, the United States plays a pivotal role in the New World Order. The demise of the Soviet Union has provided a significant opportunity to expand its sphere of influence and spread its values. The enthusiasm to pursue this opportunity is curtailed only by the assets at the United States' disposal. In order to maximize this potential, it must leverage those assets available for maximum benefit. The U.S. Government has clearly articulated its intentions

concerning the United States' position in the New World order. This paper outlines the objectives of this strategy, discusses the domestic agenda versus the international agenda, and examines the impact of limited resources on the ability to pursue both. This paper also analyzes the method chosen to maximize U.S. efforts; to wit, coalitions, their attributes and detriments, and their viability in leveraging assets. Next, this paper explores the six components of the Security Assistance Program (SAP) as a way to assist in the development and sustainment of coalitions, and as a tool of diplomacy and of international politics. It links the SAP directly to coalitions and then in turn to our national security.

### **Space Organization for Joint Warfighters Should Space be Declared an Area of Responsibility?**

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Abstract: Space is truly the next frontier for the United States and other technology-dependent nations. With the increasing investment in space systems by both the military and commercial sectors, space is rapidly becoming a vital national interest to the U.S. Protecting that infrastructure will eventually become critical to the national security of our nation as this emerging technology becomes integrated into every facet of our society. USCINCSpace maintains that space must be declared an Area of Responsibility (AOR) to allow him to protect U.S. space lines of communications (SPLOCS) and fulfill his other Presidentially-directed responsibilities. Using a systematic approach, this paper argues that Title 10 of the U.S. Code and the most recent revision to the Unified Command Plan give the CINC adequate authority to accomplish his assigned mission. Declaring space an AOR would add little military value to the warfighter in the near term. The downside of such a declaration, however, could be detrimental to the national security of the United States. While the U.S. is working diligently to achieve strategic stability with Russia in this post-cold war world, designating space an AOR could send the message that the U.S. intends to militarize space. The Russians, subsequently, would have little incentive to ratify START III and to reduce their nuclear arsenal to "safe" levels. Therefore, the unintended consequence of declaring space an AOR could be the resumption of the nuclear arms race characteristic of the cold-war era.

### **U.S. Facilities Access in Southeast Asia**

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Abstract: This paper is a review of U.S. policies governing facilities access in Southeast Asia as

contained in the National Security Strategy (NSS), the National Military Strategy (NMS), and U.S. Pacific Command Strategy. The various security strategies work in unison to achieve security in the Southeast Asia region. Access to facilities is essential should the U.S. need to rely on military force to ensure stability and maintain its national interests. There are numerous influences that could enhance the U.S. position in the region and there are some that could jeopardize the U.S. position. Some are controllable by the U.S. and others are not. The U.S. must take all the necessary steps to ensure that vital facilities will be available when needed. This paper recommends that the U.S. pursue a multilateral framework for access and that, if a multilateral agreement cannot be negotiated, the U.S. continue to pursue bilateral arrangements.

### **The United States and China in the Near Term; and the United States Military's Role**

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Abstract: The U.S. needs a constructive working relationship with China because: it is the world's most populous nation; it has nuclear weapons and plays a key role in regional stability; it is one of five permanent members in the United Nations Security Council; and it is undergoing extraordinary economic growth and promises to be an economic power early in the next century. There are significant points of friction between the U.S. and China on human rights; sovereignty issues, such as, Taiwan; proliferation of WMD; and fair trade. Both nations' leaders recognize the potential for an isolated military confrontation to escalate to a major war. However, it is in both nations' interest that they remain constructively and peacefully engaged. The U.S. military will play a significant role in ensuring peaceful relations between the two well into the 21st century.

### **Other Arms Control Issues**

### **The Spaceplane: The Catalyst for Resolution of the Boundary and Space Object Issues in the Law of Outer Space?**

[http://www.dtic.mil/cgi-bin/fulcrum\\_main.pl?database=tr\\_u2&keyfieldvalue=ADA359893&searchterms=%28ADNUMBER%20CONTAINS%20%27ada359893%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE\\_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR\\_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada359893%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9305986811643](http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA359893&searchterms=%28ADNUMBER%20CONTAINS%20%27ada359893%27%20%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28ADNUMBER%20CONTAINS%20%27ada359893%27%20%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=1&max=1&searchid=9305986811643)

Abstract: The spaceplane could be the most desirable form of space transportation in the next century. However, accompanying it are questions of whether a boundary is needed between airspace and outer space, and whether the current definition of space objects in the outer space treaties is adequate to include these hybrid vehicles. This the is concludes that the spaceplane does not portend the need for a boundary and that it will not require the development of a new definition. Chapter 1 describes some of the best known spaceplane initiatives. Chapters II and III, respectively, discuss the air law and space law regimes and arguments made for and against establishing a boundary between airspace and outer space. Chapter IV describes debates regarding the sufficiency of the term space object as it is defined in the space law regime. Chapter V analyzes the impact that spaceplanes will have on the boundary and space object' debates.

## **U.S. DEPARTMENT OF ENERGY**

### **Nuclear Proliferation**

#### **Advanced Recovery and Integrated Extraction System (ARIES): The United State's Demonstration Line for Pit Disassembly and Conversion**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Advanced~20Recovery~20and~20Integrated~20Extraction~20System~20~28ARIES~29~3a~20The~20United~20State~27s~20demonstration~20line~20for~20pit~20disassembly~20and~20conversion&type=TEXT&docid=~0341673032~202801~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04\\_loc~2egpo~07~01~00&seed\\_words\\_used=+Advance+Recovery+Integrated+Extraction&byte\\_count=2801#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Advanced~20Recovery~20and~20Integrated~20Extraction~20System~20~28ARIES~29~3a~20The~20United~20State~27s~20demonstration~20line~20for~20pit~20disassembly~20and~20conversion&type=TEXT&docid=~0341673032~202801~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04_loc~2egpo~07~01~00&seed_words_used=+Advance+Recovery+Integrated+Extraction&byte_count=2801#head)

Abstract: The Advanced Recovery and Integrated Extraction System (ARIES) is a pit disassembly and conversion demonstration line at Los Alamos National Laboratory's plutonium facility. Pits are the core of a nuclear weapon that contains fissile material. With the end of the cold war, the United States began a program to dispose of the fissile material contained in surplus nuclear weapons. In January of 1997, the Department of Energy's Office of Fissile Material Disposition issued a Record of Decision (ROD) on the disposition of surplus plutonium. This decision contained a hybrid option for disposition of the plutonium, immobilization and mixed oxide fuel. ARIES is the cornerstone of the United States plutonium disposition program that supplies the pit demonstration plutonium feed material for either of these disposition pathways. Additionally, information from this demonstration is being used to design the United States Pit Disassembly and Conversion Facility. AH of the ARIES technologies were recently developed and incorporate waste minimization. The technologies include pit bisection, hydride/dehydride, metal to oxide conversion process, packaging, and nondestructive assay (NDA). The current schedule for the ARIES integrated Demonstration will begin in the Spring of 1998. The ARIES project involves a number of DOE sites including Los Alamos National Laboratory as the lead laboratory, Lawrence Livermore National Laboratory (LLNL), and Sandia National Laboratories. Moreover, the ARIES team is heavily involved in working with Russia in their pit disassembly and conversion activities.

#### **Arms Control and Nonproliferation Technologies: First Quarter 1998 - Amps Mission to Kazakhstan**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Arms~20control~20and~20nonproliferation~20technologies~3a~20First~20quarter~201998~2e~20AMPS~20mission~20to~20Kazakhstan&type=TEXT&docid=~033726208~201771~20~2fdsk17wais~2fdata~2fgpo~2f041999~2esd03\\_loc~2egpo~07~01~00](http://www.doe.gov:80/cgi-bin/gpogate?headline=Arms~20control~20and~20nonproliferation~20technologies~3a~20First~20quarter~201998~2e~20AMPS~20mission~20to~20Kazakhstan&type=TEXT&docid=~033726208~201771~20~2fdsk17wais~2fdata~2fgpo~2f041999~2esd03_loc~2egpo~07~01~00)

Abstract: On July 12, 1996, the US Department of Energy, in partnership with Earth Search Sciences, Inc., signed an accord with the Kazakhstan Ministry of Science to use remote-sensing technology developed by the US in the Republic of Kazakhstan. This mutually beneficial agreement supported US goals for nuclear nonproliferation and Kazakhstan's goals for infrastructure and economic development. This issue of Arms Control and Nonproliferation Technologies highlights this cooperative venture, providing examples of the data collected during the June-July 1997 mission.

### **CMC Participation in the Regional Centre for Strategic Studies (RCSS) Workshop: Defense, Technology and Cooperative Security in South Asia**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=CMC~20Participation~20in~20the~20Regional~20Centre~20for~20Strategic~20Studies~20~28RCSS~29~20Workshop~3a~20Defense~2c~20Technology~20and~20Cooperative~20Security~20in~20South~20Asia&type=TEXT&docid=~0342480780~202541~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04\\_loc~2egpo~07~01~00&seed\\_words\\_used=+cmc+participation+in+the+regional&byte\\_count=2541#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=CMC~20Participation~20in~20the~20Regional~20Centre~20for~20Strategic~20Studies~20~28RCSS~29~20Workshop~3a~20Defense~2c~20Technology~20and~20Cooperative~20Security~20in~20South~20Asia&type=TEXT&docid=~0342480780~202541~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04_loc~2egpo~07~01~00&seed_words_used=+cmc+participation+in+the+regional&byte_count=2541#head)

Abstract: As an ongoing part of the collaborative efforts between the Cooperative Monitoring Center (CMC) at Sandia National Laboratories, the United States Arms Control and Disarmament Agency (ACDA), and U.S. Department of Energy (DOE), staff from the CMC served as faculty in conducting a workshop in Shanghai, China. Sponsor of the workshop was the Regional Centre for Strategic Studies (RCSS) based in Colombo, Sri Lanka. The workshop included participants from throughout South Asia and China. The CMC presented four sessions related to the role of monitoring technologies in promoting regional security and building confidence among nations. Participation in these workshops supports U.S. efforts to further regional cooperation and promote arms control, nonproliferation and other cooperative security measures and supplements efforts funded by DOE and ACDA over the past four years. The RCSS Shanghai meeting permitted a continued CMC involvement in regionally conducted training for a new generation of leaders in government, the military, and academia throughout South Asia and China. Nuclear issues are clearly a dominant South Asian concern since the nuclear tests of May 1998. However, there remains a strong interest in identifying opportunities for increased trade and reduced tensions in other areas. The RCSS and other regional organizations are enthusiastic about continued CMC involvement in future regional courses.

### **Complementary Technologies for Verification of Excess Plutonium**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Complementary~20technologies~20for~20verification~20of~20excess~20plutonium&type=TEXT&docid=~0341773290~203011~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04\\_loc~2egpo~07~01~00&seed\\_words\\_used=+NUCLEAR+WEAPONS+++01/01/1998&byte\\_count=3011#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Complementary~20technologies~20for~20verification~20of~20excess~20plutonium&type=TEXT&docid=~0341773290~203011~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04_loc~2egpo~07~01~00&seed_words_used=+NUCLEAR+WEAPONS+++01/01/1998&byte_count=3011#head)

Abstract: Three complementary measurement technologies have been identified as candidates for use in the verification of excess plutonium of weapons origin. These technologies: high- resolution

gamma-ray spectroscopy, neutron multiplicity counting, and low-resolution gamma-ray spectroscopy, are mature, robust technologies. The high-resolution gamma-ray system, Pu-600, uses the 630--670 keV region of the emitted gamma-ray spectrum to determine the ratio of  $\{^{240}\text{Pu}\}$  to  $\{^{239}\text{Pu}\}$ . It is useful in verifying the presence of plutonium and the presence of weapons-grade plutonium. Neutron multiplicity counting is well suited for verifying that the plutonium is of a safeguardable quantity and is weapons-quality material, as opposed to residue or waste. In addition, multiplicity counting can independently verify the presence of plutonium by virtue of a measured neutron self-multiplication and can detect the presence of non-plutonium neutron sources. The low-resolution gamma-ray spectroscopic technique is a template method that can provide continuity of knowledge that an item that enters the a verification regime remains under the regime. In the initial verification of an item, multiple regions of the measured low-resolution spectrum form a unique, gamma-radiation-based template for the item that can be used for comparison in subsequent verifications. In this paper the authors discuss these technologies as they relate to the different attributes that could be used in a verification regime.

## **Environmental Measurements and Technology for Non-Proliferation Objectives - Final Report**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Environmental~20measurements~20and~20technology~20for~20non~20proliferation~20objectives~2e~20Final~20report&type=TEXT&docid=~033810582~202393~20~2fdsk17wais~2fddata~2fgpo~2f041999~2esd03\\_loc~2egpo~07~01~00&seed\\_words\\_used=+PROLIFERATION+++01/01/1998&byte\\_count=2393#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Environmental~20measurements~20and~20technology~20for~20non~20proliferation~20objectives~2e~20Final~20report&type=TEXT&docid=~033810582~202393~20~2fdsk17wais~2fddata~2fgpo~2f041999~2esd03_loc~2egpo~07~01~00&seed_words_used=+PROLIFERATION+++01/01/1998&byte_count=2393#head)

Abstract: The purpose of this study is to identify multi-disciplinary and single focus laboratories from the environmental and public health communities that can serve as technical center of opportunity for nuclear, inorganic and organic analyses. The objectives of the Office of Research and Development effort are twofold: (1) to identify the technology shortcomings and technologies gaps (thus requirements) within these communities that could benefit from state-of-the-art infield analysis technologies currently under development and (2) to promote scientist-to-scientist dialog and technical exchange under such existing US government internship programs (eg SABIT/USDOC) to improve skills and work relationships. Although the data analysis will focus on environmentally sensitive signatures and materials, the office of Research and Development wishes to further its nuclear non-proliferation objectives by assessing the current technical skill and ingenious analytical tools in less- developed countries so as to broaden the base of capability for multi-species measurement technology development.

## **Joint DOE-PNC Research on the Use of Transparency in Support of Nuclear Nonproliferation**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Joint~20DOE~2dPNC~20research~20on~20the~20use~20of~20transparency~20in~20support~20of~20nuclear~20nonproliferation&type=TEXT&docid=~0341878687~203611~20~2fdsk17wais~2fdat a~2fgpo~2f051299~2esd04\\_loc~2egpo~07~01~00&seed\\_words\\_used=+joint+doe+toshiro+mochiji&byte\\_count=3611#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Joint~20DOE~2dPNC~20research~20on~20the~20use~20of~20transparency~20in~20support~20of~20nuclear~20nonproliferation&type=TEXT&docid=~0341878687~203611~20~2fdsk17wais~2fdat a~2fgpo~2f051299~2esd04_loc~2egpo~07~01~00&seed_words_used=+joint+doe+toshiro+mochiji&byte_count=3611#head)

Abstract: PNC and LANL collaborated in research on the concept of transparency in nuclear nonproliferation. The research was based on the Action Sheet No. 21, which was signed in February 1996, "The Joint Research on Transparency in Nuclear Nonproliferation" under the

``Agreement between the Power Reactor and Nuclear Fuel Development Corporation of Japan (PNC) and the US Department of Energy (DOE) for Cooperation in Research and Development Concerning Nuclear Material Control and Accounting Measures for Safeguards and Nonproliferation". The purpose of Action Sheet 21 is to provide a fundamental study on Transparency to clarify the means to improve worldwide acceptability for the nuclear energy from the nuclear nonproliferation point of view. This project consists of independent research and then joint discussion at workshops that address a series of topics and issues in transparency. The activities covered in Action Sheet 21 took place over a period of 18 months. Three work-shops were held; the first and the third hosted by PNC in Tokyo, Japan and the second hosted by LANL in Los Alamos, New Mexico, US. The following is a summary of the three workshops. The first workshop addressed the policy environment of transparency. Each side presented its perspective on the following issues: (1) a definition of transparency, (2) reasons for transparency, (3) detailed goals of transparency and (4) obstacles to transparency. The topic of the second workshop was ``Development of Transparency Options." The activities accomplished were (1) identify type of facilities where transparency might be applied, (2) define criteria for applying transparency, and (3) delineate applicable transparency options. The goal of the third workshop, ``Technical Options for Transparency," was to (1) identify conceptual options for transparency system design; (2) identify instrumentation, measurement, data collection and data processing options; (3) identify data display options; and (4) identify technical options for reprocessing, enrichment, and MOX fuel fabrication facilities.

## **Modeling Requirements for Simulating the Effects of Extreme Acts of Terrorism: A White Paper**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Modeling~20Requirements~20for~20Simulating~20the~20Effects~20of~20Extreme~20Acts~20of~20Terrorism~3a~20A~20White~20Paper&type=TEXT&docid=~0342420295~202195~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04\\_loc~2egpo~07~01~00&seed\\_words\\_used=+PROLIFERATION+++01/01/1998&byte\\_count=2195#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Modeling~20Requirements~20for~20Simulating~20the~20Effects~20of~20Extreme~20Acts~20of~20Terrorism~3a~20A~20White~20Paper&type=TEXT&docid=~0342420295~202195~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04_loc~2egpo~07~01~00&seed_words_used=+PROLIFERATION+++01/01/1998&byte_count=2195#head)

Abstract: This white paper presents the initial requirements for developing a new computer model for simulating the effects of extreme acts of terrorism in the United States. General characteristics of the model are proposed and the level of effort to prepare a complete written description of the model, prior to coding, is detailed. The model would simulate the decision processes and interactions of complex U.S. systems engaged in responding to and recovering from four types of terrorist incidents. The incident scenarios span the space of extreme acts of terrorism that have the potential to affect not only the impacted area, but also the entire nation. The model would be useful to decision-makers in assessing and analyzing the vulnerability of the nation's complex infrastructures, in prioritizing resources to reduce risk, and in planning strategies for immediate response and for subsequent recovery from terrorist incidents.

## **New Concept of Small Power Reactor Without On-site Refueling for Non-Proliferation**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=New~20concept~20of~20small~20power~20reactor~20without~20on~2dsite~20refueling~20for~20non~2d~20proliferation&type=TEXT&docid=~0343017422~205206~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04\\_loc~2egpo~07~01~00&seed\\_words\\_used=+PROLIFERATION+++01/01/1998&byte\\_count=5206#h](http://www.doe.gov:80/cgi-bin/gpogate?headline=New~20concept~20of~20small~20power~20reactor~20without~20on~2dsite~20refueling~20for~20non~2d~20proliferation&type=TEXT&docid=~0343017422~205206~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04_loc~2egpo~07~01~00&seed_words_used=+PROLIFERATION+++01/01/1998&byte_count=5206#h)



Abstract: Energy demand in developing countries is increasing to support growing populations and economies. This demand is expected to continue growing at a rapid pace well into the next century. Because current power sources, including fossil, renewable, and nuclear, cannot meet energy demands, many developing countries are interested in building a new generation of small reactor systems to help meet their needs. The U.S. recognizes the need for energy in the developing countries. In its 1998 Comprehensive Energy Strategy, the Department of Energy calls for research into low-cost, proliferation-resistant, nuclear reactor technologies to ensure that this demand can be met in a manner consistent with U.S. non-proliferation goals and policies. This research has two primary thrusts: first, the development of a small proliferation-resistant nuclear system (i.e., a technology focus); second, the continuation of open communication with the international community through early engagement and cooperation on small reactor development. A system that meets developing country requirements must: (1) achieve reliably safe operation with a minimum of maintenance and supporting infrastructure; (2) offer economic competitiveness with alternative energy sources available to the candidate sites; and (3) demonstrate significant improvements in proliferation resistance relative to existing reactor systems. These challenges are the most significant driving forces behind the LLNL proposed program for development of a new, small nuclear reactor system. This report describes a technical approach for developing small nuclear power systems for use in developing countries. The approach being proposed will establish a preliminary set of requirements that, if met, will cause new innovative approaches to system design to be used. The proposed approach will borrow from experience gained over the past forty years with four types of nuclear reactor technologies (LWR, LMR, HTGR, and MSR) to develop four or more pre-conceptual designs. The pre-conceptual designs will be used to confirm the adequacy of the requirements through iteration and trade studies. A down selection to a preferred and backup concept would be made following a 12-18 month design effort. The selected designs, system design specifications, and the necessary R&D programs would be developed in greater detail over the next three and one-half years. A reactor in the 50 to 150 MWe class, nominally 100 MWe, shows the best potential for meeting these challenges. The system will have unique characteristics to achieve proliferation resistance, and will maximize the reliance on passive safety features to reduce the risk of serious accidents and their consequences, simplify operations and maintenance, and reduce the need for the developing country to establish a sophisticated and expensive nuclear infrastructure. In particular, to eliminate all on-site refueling, the reactor will be equipped with a long-life core that will be returned to the supplier when spent. This process will be managed under international control to further both overall non-proliferation objectives and to reduce the infrastructure burden on the developing country. It will also reduce the anticipated burden and expense to the International Atomic Energy Agency for assuring security associated with expanded international use of nuclear energy. An integral part of the program will be the development of new approaches for implementing international safeguards applicable to the entire fuel cycle including recycling and waste disposal. The report discusses the preliminary requirements and the rationale for selecting them. It then discusses the four nuclear system technologies and how they might proceed to meet the requirements. Brief discussions are provided on the approaches to stimulating the appropriate international and industrial participation necessary to finance development of a design with improved proliferation resistance

that is useful to the developing countries.

### **Nonproliferation Characteristics of Advanced Fuel Cycle Concepts**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Nonproliferation~20characteristics~20of~20advanced~20fuel~20cycle~20concepts&type=TEXT&docid=~03234952~201689~20~2fdsk17wais~2fdata~2fgpo~2f101698~2esd08\\_loc~2egpo~07~01~00&seed\\_words\\_used=+PROLIFERATION+++01/01/1998&byte\\_count=1689#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Nonproliferation~20characteristics~20of~20advanced~20fuel~20cycle~20concepts&type=TEXT&docid=~03234952~201689~20~2fdsk17wais~2fdata~2fgpo~2f101698~2esd08_loc~2egpo~07~01~00&seed_words_used=+PROLIFERATION+++01/01/1998&byte_count=1689#head)

**Abstract:** The purpose of this study is to comment on the proliferation characteristic profiles of some of the proposed fuel cycle alternatives to help ensure that nonproliferation concerns are introduced into the early stages of a fuel cycle concept development program, and to perhaps aid in the more effective implementation of the international nonproliferation regime initiatives and safeguards methods and systems. Alternative cycle concepts proposed by several countries involve the recycle of spent fuel without the separation of plutonium from uranium and fission products.

### **Nonproliferation Impacts Assessment for the Management of the Savannah River Site Aluminum-Based Spent Nuclear Fuel**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Nonproliferation~20impacts~20assessment~20for~20the~20management~20of~20the~20Savannah~20River~20Site~20aluminum~2dbased~20spent~20nuclear~20fuel&type=TEXT&docid=~033749054~203068~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04\\_loc~2egpo~07~01~00&seed\\_words\\_used=+nonproliferation+impacts+assessment+for+the+management&byte\\_count=3068#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Nonproliferation~20impacts~20assessment~20for~20the~20management~20of~20the~20Savannah~20River~20Site~20aluminum~2dbased~20spent~20nuclear~20fuel&type=TEXT&docid=~033749054~203068~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04_loc~2egpo~07~01~00&seed_words_used=+nonproliferation+impacts+assessment+for+the+management&byte_count=3068#head)

**Abstract:** On May 13, 1996, the US established a new 10-year policy to accept and manage foreign research reactor spent nuclear fuel containing uranium enriched in the US. The goal of this policy is to reduce civilian commerce in weapons-usable highly enriched uranium (HEU), thereby reducing the risk of nuclear weapons proliferation. Two key disposition options under consideration for managing this fuel include conventional reprocessing and new treatment and packaging technologies. The Record of Decision specified that, while evaluating the reprocessing option, "DOE will commission or conduct an independent study of the nonproliferation and other (e.g., cost and timing) implications of chemical separation of spent nuclear fuel from foreign research reactors." DOE's Office of Arms Control and Nonproliferation conducted this study consistent with the aforementioned Record of Decision. This report addresses the nonproliferation implications of the technologies under consideration for managing aluminum-based spent nuclear fuel at the Savannah River Site. Because the same technology options are being considered for the foreign research reactor and the other aluminum-based spent nuclear fuels discussed in Section ES.1, this report addresses the nonproliferation implications of managing all the Savannah River Site aluminum-based spent nuclear fuel, not just the foreign research reactor spent nuclear fuel. The combination of the environmental impact information contained in the draft EIS, public comment in response to the draft EIS, and the nonproliferation information contained in this report will enable the Department to make a sound decision regarding how to manage all aluminum-based spent nuclear fuel at the Savannah River Site.

### **Plutonium in an Enduring Fuel Cycle**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Plutonium~20in~20an~20enduring~20fuel~20cycle&type=TEXT&docid=~0342520750~202139~20~2fdsk17wais~2fdata~2fgpo~2f021599~2esd01\\_loc~2egpo~07~01~00&seed\\_words\\_used=+DISMANTLEMENT+++01/01/1998&byte\\_count=2139#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Plutonium~20in~20an~20enduring~20fuel~20cycle&type=TEXT&docid=~0342520750~202139~20~2fdsk17wais~2fdata~2fgpo~2f021599~2esd01_loc~2egpo~07~01~00&seed_words_used=+DISMANTLEMENT+++01/01/1998&byte_count=2139#head)

Abstract: Nuclear fuel cycles evolved over the past five decades have allowed many nations of the world to enjoy the benefits of nuclear energy, while contributing to the sustainable consumption of the world's energy resources. The nuclear fuel cycle for energy production suffered many traumas since the 1970s because of perceived risks of proliferation of nuclear weapons. However, the experience of the past five decades has shown that the world community is committed to safeguarding all fissile materials and continuing the use of nuclear energy resources. Decisions of a few nations to discard spent nuclear fuels in geologic formations are contrary to the goals of an enduring nuclear fuel cycle and sustainable development being pursued by the world community. The maintenance of an enduring nuclear fuel cycle is dependent on sensible management of all the resources of the fuel cycle, including spent fuels.

### **Program for Upgrading Nuclear Materials Protection, Control, and Accounting at All Facilities Within the All-Russian Institute of Experimental Physics (Vniief)**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Program~20for~20upgrading~20nuclear~20materials~20protection~2c~20control~2c~20and~20accounting~20at~20all~20facilities~20within~20the~20All~2dRussian~20Institute~20of~20Experimental~20Physics~20~28VNIIEF~29&type=TEXT&docid=~0341284136~201873~20~2fdsk17wais~2fdata~2fgpo~2f061099~2esd05\\_loc~2egpo~07~01~00&seed\\_words\\_used=+DISMANTLEMENT+++01/01/1998&byte\\_count=1873#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Program~20for~20upgrading~20nuclear~20materials~20protection~2c~20control~2c~20and~20accounting~20at~20all~20facilities~20within~20the~20All~2dRussian~20Institute~20of~20Experimental~20Physics~20~28VNIIEF~29&type=TEXT&docid=~0341284136~201873~20~2fdsk17wais~2fdata~2fgpo~2f061099~2esd05_loc~2egpo~07~01~00&seed_words_used=+DISMANTLEMENT+++01/01/1998&byte_count=1873#head)

Abstract: As part of the Department of Energy-Russian program for strengthening nuclear material protection, control, and accounting (MPC and A), plans have now been formulated to install an integrated MPC and A system at all facilities containing large quantities of weapons-usable nuclear material within the All-Russian Institute of Experimental Physics (VNIIEF, Arzamas-16) complex. In addition to storage facilities, the complex houses a number of critical facilities used to conduct nuclear physics research and facilities for developing procedures for disassembly of nuclear weapons.

### **Public Perspectives on Nuclear Security: U.S. National Security Surveys, 1993--1997**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Public~20perspectives~20on~20nuclear~20security~2e~20US~20national~20security~20surveys~2c~201993~2d~2d1997&type=TEXT&docid=~0344416347~203304~20~2fdsk17wais~2fdata~2fgpo~2f021599~2esd01\\_loc~2egpo~07~01~00&seed\\_words\\_used=+Public+perspectives+on+nuclear+security+herron,+k.+g.&byte\\_count=3304#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Public~20perspectives~20on~20nuclear~20security~2e~20US~20national~20security~20surveys~2c~201993~2d~2d1997&type=TEXT&docid=~0344416347~203304~20~2fdsk17wais~2fdata~2fgpo~2f021599~2esd01_loc~2egpo~07~01~00&seed_words_used=+Public+perspectives+on+nuclear+security+herron,+k.+g.&byte_count=3304#head)

Abstract: This is the third report in a series of studies to examine how US attitudes about nuclear security are evolving in the post-Cold War era and to identify trends in public perceptions and preferences relevant to the evolution of US nuclear security policy. It presents findings from three surveys: a nationwide telephone survey of randomly selected members of the US general public; a written survey of randomly selected members of American Men and Women of Science; and a written survey of randomly selected state legislators from all fifty US states. Key areas of investigation included nuclear security, cooperation between US and Russian scientists about

nuclear issues, vulnerabilities of critical US infrastructures and responsibilities for their protection, and broad areas of US national science policy. While international and US national security were seen to be slowly improving, the primary nuclear threat to the US was perceived to have shifted from Russia to China. Support was found for nuclear arms control measures, including mutual reductions in stockpiles. However, respondents were pessimistic about eliminating nuclear armaments, and nuclear deterrence continued to be highly valued. Participants favored decreasing funding for developing and testing new nuclear weapons, but supported increased investments in nuclear weapons infrastructure. Strong concerns were expressed about nuclear proliferation and the potential for nuclear terrorism. Support was evident for US scientific cooperation with Russia to strengthen security of Russian nuclear assets. Elite and general public perceptions of external and domestic nuclear weapons risks and external and domestic nuclear weapons benefits were statistically significantly related to nuclear weapons policy options and investment preferences. Demographic variables and individual belief systems were systematically related both to risk and benefit perceptions and to policy and spending preferences.

### **Russia-U.S. Joint Program on the Safe Management of Nuclear Materials**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Russia~2dU~2eS~2e~20joint~20program~20on~20the~20safe~20managem~20of~20nuclear~20materials&type=TEXT&docid=~0344302578~202219~20~2fdsk17wais~2fdata~2fgpo~2f021599~2esd01\\_loc~2egpo~07~01~00&seed\\_words\\_used=+U.S.+Russian+weapons+dismantlement+process++producing+hundreds++++01/01/1998&byte\\_count=2219#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Russia~2dU~2eS~2e~20joint~20program~20on~20the~20safe~20managem~20of~20nuclear~20materials&type=TEXT&docid=~0344302578~202219~20~2fdsk17wais~2fdata~2fgpo~2f021599~2esd01_loc~2egpo~07~01~00&seed_words_used=+U.S.+Russian+weapons+dismantlement+process++producing+hundreds++++01/01/1998&byte_count=2219#head)

Abstract: The Russia-US joint program on the safe management of nuclear materials was initiated to address common technical issues confronting the US and Russia in the management of excess weapons grade nuclear materials. The program was initiated after the 1993 Tomsk-7 accident. This paper provides an update on program activities since 1996. The Fourth US Russia Nuclear Materials Safety Management Workshop was conducted in March 1997. In addition, a number of contracts with Russian Institutes have been placed by Lawrence Livermore National Laboratory (LLNL) and Sandia National Laboratories (SNL). These contracts support research related to the safe disposition of excess plutonium (Pu) and highly enriched uranium (HEU). Topics investigated by Russian scientists under contracts with SNL and LLNL include accident consequence studies, the safety of anion exchange processes, underground isolation of nuclear materials, and the development of materials for the immobilization of excess weapons Pu.

### **Russia-U.S. Joint Program on the Safe Management of Nuclear Materials: Approaches to Prioritizing the Lab to Lab Project**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Russia~2dU~2eS~2e~20Joint~20Program~20on~20the~20Safe~20Manage~20of~20Nuclear~20Materials~3a~20Approaches~20to~20Prioritizing~20the~20Lab~20to~20Lab~20Project&type=TEXT&docid=~0342011600~203657~20~2fdsk17wais~2fdata~2fgpo~2f041999~2esd03\\_loc~2egpo~07~01~00&seed\\_words\\_used=+0430m40+11/05/1998&byte\\_count=3657#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Russia~2dU~2eS~2e~20Joint~20Program~20on~20the~20Safe~20Manage~20of~20Nuclear~20Materials~3a~20Approaches~20to~20Prioritizing~20the~20Lab~20to~20Lab~20Project&type=TEXT&docid=~0342011600~203657~20~2fdsk17wais~2fdata~2fgpo~2f041999~2esd03_loc~2egpo~07~01~00&seed_words_used=+0430m40+11/05/1998&byte_count=3657#head)

Abstract: The U.S. and Russian weapons dismantlement process is producing hundreds of tons of excess plutonium (Pu) and highly enriched uranium (HEU) fissile materials. The nuclear operations associated with the final disposition of these materials will be occurring in both countries for decades. A significant accident during these operations could delay the disposition

process. Russia- U.S. collaborative efforts to address safety issues associated with disposition processes have been ongoing since 1993. The experience of these collaborative efforts have demonstrated the need for a systematic and formalized approach to identifying and prioritizing collaborative projects. A systematic approach to the successful implementation of a formal program will require the definition of year by year program objectives, specific technical program areas, a process for the prioritization and selection of projects, and identification of performance measures to evaluate the success of projects. Specialized working groups established for each technical area are needed to define research priorities, review research proposals, and recommend proposals for funding. A systematic approach to the establishment of a formal U.S.-Russia cooperative program will serve to ensure the safety and continuity of disposition processes and reduce the nuclear proliferation risks presented by this material. The U.S. and Russian weapons dismantlement process is producing hundreds of tons of excess plutonium (Pu) and highly enriched uranium (HEU) fissile materials. The U.S. and Russia are both converting and blending HEU into low enriched uranium (LEU) for use in existing reactors. Russia also plans to field reactors with excess Pu. The U.S. is on a two-path approach for the disposition of excess Pu: (1) use of Pu in existing reactors and/or (2) immobilization of the Pu in glass or ceramics followed by geologic disposal. The fissile nuclear materials storage, handling, processing, and transportation processes associated with the disposition process will be occurring in both countries for decades. A significant accident at any point in the process could significantly delay the disposition process. Russia-U.S. collaborative efforts to address safety issues associated with nuclear processes required for the disposition of excess weapons grade nuclear materials were initiated in response to the 1993 Tomsk-7 accident. A joint Russia-U.S. team evaluated the causes of an explosion in a nuclear fuel reprocessing tank at the Tomsk-7.

### **Russian-American Strategy for Stabilization and Immobilization of Excess Russian Weapons Origin Plutonium**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Russian~2dAmerican~20strategy~20for~20stabilization~20and~20immobilization~20of~20excess~20Russian~20weapons~20origin~20plutonium&type=TEXT&docid=~0346145804~202277~20~2fdsk17wais~2fddata~2fgpo~2f121098~2esd10\\_loc~2egpo~07~01~00&seed\\_words\\_used=+U.S.++Russia+n+weapons+dismantlement+process++producing+hundreds++++01/01/1998&byte\\_count=2277#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Russian~2dAmerican~20strategy~20for~20stabilization~20and~20immobilization~20of~20excess~20Russian~20weapons~20origin~20plutonium&type=TEXT&docid=~0346145804~202277~20~2fdsk17wais~2fddata~2fgpo~2f121098~2esd10_loc~2egpo~07~01~00&seed_words_used=+U.S.++Russia+n+weapons+dismantlement+process++producing+hundreds++++01/01/1998&byte_count=2277#head)

Abstract: In the US, impure Pu-containing materials such as residues and scrapes are in storage, in known quantities, and in materials of various compositions with known Pu contents. However, in Russia, there are no substantial quantities of accumulated impure Pu-containing materials awaiting processing either for disposition or for transuranic (TRU) geologic disposal as there are in the U.S. during the Cold War, the Russian approach to Pu processing for weapons production was different from that of the US. All impure Pu- containing materials were routinely reprocessed, and the residual Pu was recovered and purified for reuse until residual Pu levels of less than 200 mg/kg (less than 200 ppm) in any discharged solid process waste streams were reached. Wastes containing less than 200 ppm Pu were routinely discharged for burial in cement waste forms. Russia is studying changing from this practice of recovery of impure Pu for reuse to immobilizing future impure Pu-containing materials into solids at higher concentrations of Pu than 200 ppm for eventual geologic disposal.

## Russia's Great Game in a Nuclear South Asia

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Russia~27s~20Great~20Game~20in~20a~20nuclear~20South~20Asia&type=TEXT&docid=~0341003868~203308~20~2fdsk17wais~2fdata~2fgpo~2f031899~2esd02\\_loc~2egpo~07~01~00&seed\\_words\\_used=+NUCLEAR++PROLIFERATION+++01/01/1998&byte\\_count=3308#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Russia~27s~20Great~20Game~20in~20a~20nuclear~20South~20Asia&type=TEXT&docid=~0341003868~203308~20~2fdsk17wais~2fdata~2fgpo~2f031899~2esd02_loc~2egpo~07~01~00&seed_words_used=+NUCLEAR++PROLIFERATION+++01/01/1998&byte_count=3308#head)

Abstract: Lost in the noise of Pakistan's nuclear weapon tests in the western Baluchistan desert on 28 and 30 May was a surprising diplomatic move by Russia. On 23 May, Russia became the first state to express its willingness to recognize India as a nuclear-weapon state, provided that India commits itself to the international nonproliferation regime. Russia's Ambassador to India, Albert Chernyshev, stated in the days after the Indian but before the Pakistani nuclear tests that ``India proclaimed itself a nuclear weapons power. One now hopes that India will behave as a nuclear weapons power by acting responsibly. Every nuclear weapons state has some rights. But for getting recognition it must have some obligations. Once it is ready to show these obligations by joining the nonproliferation regime, its recognition as a nuclear weapons power will follow." Russia's Great Game in South Asia in pursuit of short-term economic and other interests appears to be a serious obstacle on the path to dealing effectively with the South Asian nuclear crisis. Grave damage to security, stability and nonproliferation has already resulted from India's and Pakistan's actions, but the situation does not have to spiral out of control. It is imperative that the international community respond appropriately to this challenge. The international community is at a crossroads and Russia's actions will be critical. Will it be willing to go beyond the narrow economic and political calculations reflected in its diplomatic posturing, and take actions that will serve its long-term interests by bridging differences with other great powers in order to demonstrate to India that it has not chosen the right path. If Russia decides it can gain from India's current, perilous path and blocks or otherwise frustrates appropriate responses, the nuclear danger on the subcontinent will escalate and the global regimes to promote nonproliferation and to ban testing will be seriously, perhaps fatally, weakened with unpredictable regional and global effects.

## Stockpile Stewardship Program

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Stockpile~20stewardship~20program&type=TEXT&docid=~0343011681~201287~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04\\_loc~2egpo~07~01~00&seed\\_words\\_used=+stockpile+stewardship+brown,+p.+s.&byte\\_count=1287#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Stockpile~20stewardship~20program&type=TEXT&docid=~0343011681~201287~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04_loc~2egpo~07~01~00&seed_words_used=+stockpile+stewardship+brown,+p.+s.&byte_count=1287#head)

Abstract: In this paper, which has been extracted and edited from a Department of Energy publication that LLNL helped write, we present an overview of the current program and highlight some of the accomplishments and progress made to date.

## Threat Reduction Information Management: The TREND (formerly referred to as the US/NIS ExtraNet)

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Threat~20reduction~20information~20management~3a~20The~20TREND~20~28formerly~20referred~20to~20as~20the~20US~2fNIS~20ExtraNet~29&type=TEXT&docid=~0341379584~202806~20~2fdsk17wais~2fdata~2fgpo~2f041999~2esd03\\_loc~2egpo~07~01~00&seed\\_words\\_used=+threat+reduction+information+cernicek&byte\\_count=2806#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Threat~20reduction~20information~20management~3a~20The~20TREND~20~28formerly~20referred~20to~20as~20the~20US~2fNIS~20ExtraNet~29&type=TEXT&docid=~0341379584~202806~20~2fdsk17wais~2fdata~2fgpo~2f041999~2esd03_loc~2egpo~07~01~00&seed_words_used=+threat+reduction+information+cernicek&byte_count=2806#head)

Abstract: Defense programs still play a central role in protecting and defending US interests, while the government has also developed threat reduction programs to reduce dangers posed by the increasing specter of proliferation of weapons of mass destruction (WMD). Like other defense programs, threat reduction programs produce and manage a great deal of information. The programs involve interaction between collaborative partners, foreign and domestic, that act to prevent the spread of WMD. The unhindered flow of information between those involved in these projects is of great importance to the successes of these programs. For the nuclear threat reduction programs, a system with comprehensive access control was needed to support daily business processes, and to capture programmatic information, simplify it, and synthesize it -- the purpose and definition of information management in this case. Using these criteria, the Threat Reduction ExtraNet (TREND) system, formerly referred to as the US/NIS ExtraNet, was created and implemented by Los Alamos National Laboratory to meet the information management needs of threat reduction programs such as the Initiatives for Proliferation Prevention (IPP) program. By supporting this nonproliferation program alone, the TREND system supports US nuclear nonproliferation objectives, and it has enabled new opportunities for enhanced program

transparency at many different levels, both in the US and Newly Independent States (NIS) of the Former Soviet Union (FSU).

### **U.S. Nuclear Reaction Data Program in Support of Basic Research**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=U~2eS~2e~20nuclear~20reaction~20data~20program~20in~20support~20of~20basic~20research&type=TEXT&docid=~0343262020~201737~20~2fdsk17wais~2fddata~2fgpo~2f121098~2esd10\\_loc~2egpo~07~01~00&seed\\_words\\_used=+The+U.S.+Russian+weapons+dismantlement+process+is+producing+hundreds+of+++01/01/1998&byte\\_count=1737#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=U~2eS~2e~20nuclear~20reaction~20data~20program~20in~20support~20of~20basic~20research&type=TEXT&docid=~0343262020~201737~20~2fdsk17wais~2fddata~2fgpo~2f121098~2esd10_loc~2egpo~07~01~00&seed_words_used=+The+U.S.+Russian+weapons+dismantlement+process+is+producing+hundreds+of+++01/01/1998&byte_count=1737#head)

Abstract: Information about the US Nuclear Reaction Data Network (USNRDN) such as its members, work in progress, summaries of meetings, and organizational details may be found in its WWW Homepage. This paper is an overview of the data support provided by the network for basic research in nuclear astrophysics, radioactive ion beams, high energy heavy ion and electron interactions and related activities involving all aspects of data stewardship.

### **U.S./Russian Affirmation Process of the Russian Fissile Material Container Design**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=US~2fRussian~20affirmation~20process~20of~20the~20Russian~20fissile~20material~20container~20design&type=TEXT&docid=~0344904171~203199~20~2fdsk17wais~2fddata~2fgpo~2f121098~2esd10\\_loc~2egpo~07~01~00&seed\\_words\\_used=+The+U.S.+Russian+weapons+dismantlement+process+is+producing+hundreds+of+++01/01/1998&byte\\_count=3199#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=US~2fRussian~20affirmation~20process~20of~20the~20Russian~20fissile~20material~20container~20design&type=TEXT&docid=~0344904171~203199~20~2fdsk17wais~2fddata~2fgpo~2f121098~2esd10_loc~2egpo~07~01~00&seed_words_used=+The+U.S.+Russian+weapons+dismantlement+process+is+producing+hundreds+of+++01/01/1998&byte_count=3199#head)

Abstract: The US government agreed to provide the Russian Federation with containers to support the dismantlement of Russian nuclear weapons as part of the Nunn-Lugar Cooperative Threat Reduction program. In February 1996, the ``affirmation" of the Russian Fissile Material container design was completed. The ``affirmation" process allowed a joint program between the Russian and US governments to proceed without the exchange of sensitive weapons specific

information. The Russian Fissile Material container program is an integral part of the Cooperative Threat Reduction program wherein the US government provides assistance to the states of the Former Soviet Union for dismantlement of their nuclear stockpile. The Cooperative Threat Reduction program is managed by the US Defense Special Weapons Agency. Sandia National Laboratories was selected as the design agency and technical point of contact for the Russian Federation. The Department of Energy, which certifies containers for weapons shipments in the US, provided an independent assessment of the Sandia designed container to assure that it met the requirements of the August 31, 1993 AT-4OOR Container Requirements [Sandia National Laboratories, 1993] document which was agreed to by representatives of the US and Russian Federation. The "affirmation" process was undertaken in lieu of a certification process. This process was a formal review by the US Department of Energy of Sandia's design and testing of the Russian Fissile Material container. The affirmation was intended to provide the Russian Federation with assurance that the container met the negotiated requirements including specific sections of IAEA Safety Series 6 [IAEA, 1985]. The process stopped short of a certification process that would have required weapons specific design information.

### **U.S. Support Program Tasks**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=U~2eS~2e~20Support~20Program~20tasks&type=TEXT&docid=~0341592707~201923~20~2fdsk17wais~2fdata~2fgpo~2f041999~2esd03\\_loc~2egpo~07~01~00&seed\\_words\\_used=+U.S.++Russian+weapons+dismantlement+process++producing+hundreds++++01/01/1998&byte\\_count=1923#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=U~2eS~2e~20Support~20Program~20tasks&type=TEXT&docid=~0341592707~201923~20~2fdsk17wais~2fdata~2fgpo~2f041999~2esd03_loc~2egpo~07~01~00&seed_words_used=+U.S.++Russian+weapons+dismantlement+process++producing+hundreds++++01/01/1998&byte_count=1923#head)

Abstract: In the fall of 1993, President Clinton announced before the United Nations General Assembly, that the US would voluntarily offer excess fissile material of weapons origin to International Atomic Energy Agency (IAEA) safeguards. There are presently five US Support Program tasks at work. Three are complete, and two are underway. Reports are available from two of the completed SP-1s; a draft is in preparation for the third. These tasks are: (1) plutonium scrap multiplicity counter at Hanford; (2) calorimeter authentication at Hanford; (3) large neutron multiplicity counter at Rocky Flats; (4) calorimeter authentication at Rocky Flats; and (5) safeguards approach support at the APSF, SRS. The status of the first four tasks above is described here. Information on the work at Savannah River is contained in a separate paper.

### **U.S. Weapons-Usable Plutonium Disposition Policy: Implementation of the MOX Fuel Option**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=U~2eS~2e~20weapons~2dusable~20plutonium~20disposition~20policy~3a~20Implementation~20of~20the~20MOX~20fuel~20option&type=TEXT&docid=~033158844~202384~20~2fdsk17wais~2fdata~2fgpo~2f021599~2esd01\\_loc~2egpo~07~01~00&seed\\_words\\_used=+U.S.++Russian+weapons+dismantlement+process++producing+hundreds++++01/01/1998&byte\\_count=2384#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=U~2eS~2e~20weapons~2dusable~20plutonium~20disposition~20policy~3a~20Implementation~20of~20the~20MOX~20fuel~20option&type=TEXT&docid=~033158844~202384~20~2fdsk17wais~2fdata~2fgpo~2f021599~2esd01_loc~2egpo~07~01~00&seed_words_used=+U.S.++Russian+weapons+dismantlement+process++producing+hundreds++++01/01/1998&byte_count=2384#head)

Abstract: A comprehensive case study was conducted on the policy problem of disposing of US weapons-grade plutonium, which has been declared surplus to strategic defense needs. Specifically, implementation of the mixed-oxide fuel disposition option was examined in the context of national and international nonproliferation policy, and in contrast to US plutonium policy. The study reveals numerous difficulties in achieving effective implementation of the mixed-oxide fuel option including unresolved licensing and regulatory issues, technological



uncertainties, public opposition, potentially conflicting federal policies, and the need for international assurances of reciprocal plutonium disposition activities. It is believed that these difficulties can be resolved in time so that the implementation of the mixed-oxide fuel option can eventually be effective in accomplishing its policy objective.

## **The United States Pit Disassembly and Conversion Project -- Meeting the MOX Fuel Specification**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=The~20United~20States~20pit~20disassembly~20and~20conversion~20project~20~2d~2d~20Meeting~20the~20MOX~20fuel~20specification&type=TEXT&docid=~0341735411~203137~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04\\_loc~2egpo~07~01~00&seed\\_words\\_used=+PROLIFERATION+++01/01/1998&byte\\_count=3137#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=The~20United~20States~20pit~20disassembly~20and~20conversion~20project~20~2d~2d~20Meeting~20the~20MOX~20fuel~20specification&type=TEXT&docid=~0341735411~203137~20~2fdsk17wais~2fdata~2fgpo~2f051299~2esd04_loc~2egpo~07~01~00&seed_words_used=+PROLIFERATION+++01/01/1998&byte_count=3137#head)

Abstract: The US is actively involved in demonstrating the disassembly of nuclear weapons pits to an unclassified form readied for disposition. The MOX option is the most likely path forward for plutonium that originated from nuclear weapon pits. The US demonstration line for pit disassembly and conversion is known as ARIES, the advanced recovery and integrated extraction system. The ARIES demonstration line is being used to gather data in an integrated fashion of the technologies needed for pit disassembly and conversion. These activities include the following modules: pit bisection, hydride-dehydride, oxide conversion, canning, electrolytic decontamination, and nondestructive assay (NDA). Pit bisection swages a pit in half. Hydride-dehydride converts the pit plutonium metal to an unclassified metal button. To convert the plutonium metal to an oxide the US is investigating a number of options. The primary oxide conversion approach involves variations of combining plutonium hydriding and subsequent oxidation. Another approach is to simply oxidize the metal under controlled conditions-direct metal oxidation (DMO). To remove the gallium from the plutonium oxide, a thermal distillation approach is being used. These pyrochemical approaches will substantially reduce the wastes produced for oxide conversion of weapon plutonium, compared to traditional aqueous processing. The packaging of either the plutonium metal or oxide to long term storage criteria involves the canning and electrolytic decontamination modules. The NDA suite of instruments is then used to assay the material in the containers, which enables international verification without the need to open the containers and repackage them. All of these processes are described.

## **Uranium-233 Waste Definition: Disposal Options, Safeguards, Criticality Control, and Arms Control**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Uranium~2d233~20waste~20definition~3a~20Disposal~20options~2c~20safeguards~2c~20criticality~20control~2c~20and~20arms~20control&type=TEXT&docid=~0343704275~203210~20~2fdsk17wais~2fdata~2fgpo~2f021599~2esd01\\_loc~2egpo~07~01~00&seed\\_words\\_used=+uranium+233+waste+definition+forsberg,+c.+w.+07/07/1998+&byte\\_count=3210#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Uranium~2d233~20waste~20definition~3a~20Disposal~20options~2c~20safeguards~2c~20criticality~20control~2c~20and~20arms~20control&type=TEXT&docid=~0343704275~203210~20~2fdsk17wais~2fdata~2fgpo~2f021599~2esd01_loc~2egpo~07~01~00&seed_words_used=+uranium+233+waste+definition+forsberg,+c.+w.+07/07/1998+&byte_count=3210#head)

Abstract: The US investigated the use of  $\{^{233}\text{U}\}$  for weapons, reactors, and other purposes from the 1950s into the 1970s. Based on the results of these investigations, it was decided not to use  $\{^{233}\text{U}\}$  on a large scale. Most of the  $\{^{233}\text{U}\}$ -containing materials were placed in long-term storage. At the end of the cold war, the US initiated, as part of its arms control policies, a disposition program for excess fissile materials. Other programs were accelerated for disposal

of radioactive wastes placed in storage during the cold war. Last, potential safety issues were identified related to the storage of some {sup 233}U-containing materials. Because of these changes, significant activities associated with {sup 233}U-containing materials are expected. This report is one of a series of reports to provide the technical bases for future decisions on how to manage this material. A basis for defining when {sup 233}U- containing materials can be managed as waste and when they must be managed as concentrated fissile materials has been developed. The requirements for storage, transport, and disposal of radioactive wastes are significantly different than those for fissile materials. Because of these differences, it is important to classify material in its appropriate category. The establishment of a definition of what is waste and what is fissile material will provide the guidance for appropriate management of these materials. Wastes are defined in this report as materials containing sufficiently small masses or low concentrations of fissile materials such that they can be managed as typical radioactive waste. Concentrated fissile materials are defined herein as materials containing sufficient fissile content such as to warrant special handling to address nuclear criticality, safeguards, and arms control concerns.

## **Nuclear Testing**

### **Analyses of Near-Field and Near-Regional Signals from the Black Thunder Mine**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Analyses+of+Near-Field+and+Near-Regional+Signals+from+the+Black+Thunder+Mine>

Abstract not available on this web site

### **Comprehensive Test Ban Treaty Research and Development: Plans and Accomplishments ... From Signature to Entry into Force**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Comprehensive~20Test~20Ban~20Treaty~20research~20and~20development~3a~20plans~20and~20accomplishments~20~2e~2e~2efrom~20signature~20to~20entry~20into~20force&type=TEXT&docid=~03220945~201325~20~2fdsk17wais~2fddata~2fgpo~2f111098~2esd09\\_loc~2egpo~07~01~00&seed\\_words\\_used=+comprehensive+test+ban+06/1998+&byte\\_count=1325#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Comprehensive~20Test~20Ban~20Treaty~20research~20and~20development~3a~20plans~20and~20accomplishments~20~2e~2e~2efrom~20signature~20to~20entry~20into~20force&type=TEXT&docid=~03220945~201325~20~2fdsk17wais~2fddata~2fgpo~2f111098~2esd09_loc~2egpo~07~01~00&seed_words_used=+comprehensive+test+ban+06/1998+&byte_count=1325#head)

Abstract: This brochure describes the high-priority R&D that is being pursued in the DOE Comprehensive Test Ban Treaty (CTBT) R&D Program and how it will support effective CTBT monitoring. Monitoring challenges, sensor systems, signal analysis, resolution of ambiguities, and the timeline for CTBT history and program milestones are covered.

### **Cooperative Monitoring Center Occasional Paper/4: Missile Control in South Asia and the Role of Cooperative Monitoring Technology**

<http://www.doe.gov:80/cgi-bin/gpogate?headline=Cooperative~20Monitoring~20Center~20Occasional~20Paper~2f4~3a~20Missile~20Control~20in~20South~20Asia~20and~20the~20Role~20of~20Cooperative~20Monitoring~20>

[Technology&type=TEXT&docid=~0342343271~202106~20~2fdsk17wais~2fddata~2fgpo~2f051299~2esd04\\_loc~2egpo~07~01~00&seed\\_words\\_used=+cooperative+monitoring+10/01/98&byte\\_count=2106#head](http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Data+Surety+Demonstrations)

Abstract: The succession of nuclear tests by India and Pakistan in May 1998 has changed the nature of their missile rivalry, which is only one of numerous manifestations of their relationship as hardened adversaries, deeply sensitive to each other's existing and evolving defense capabilities. The political context surrounding this costly rivalry remains unmediated by arms control measures or by any nascent prospect of detente. As a parallel development, sensible voices in both countries will continue to talk of building mutual confidence through openness to avert accidents, misjudgments, and misinterpretations. To facilitate a future peace process, this paper offers possible suggestions for stabilization that could be applied to India's and Pakistan's missile situation. Appendices include descriptions of existing missile agreements that have contributed to better relations for other countries as well as a list of the cooperative monitoring technologies available to provide information useful in implementing subcontinent missile regimes.

### **Data Surety Demonstrations**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Data+Surety+Demonstrations>

Abstract not available on this web site

### **Development of a Xenon Detector for Treaty Verification. Final Report**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Development~20of~20a~20xenon~20detector~20for~20treaty~20verification~2e~20Final~20report&type=TEXT&docid=~0341231469~202040~20~2fdsk17wais~2fddata~2fgpo~2f041999~2esd03\\_loc~2egpo~07~01~00&seed\\_words\\_used=+development+of+a+xenon+07/21/98&byte\\_count=2040#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Development~20of~20a~20xenon~20detector~20for~20treaty~20verification~2e~20Final~20report&type=TEXT&docid=~0341231469~202040~20~2fdsk17wais~2fddata~2fgpo~2f041999~2esd03_loc~2egpo~07~01~00&seed_words_used=+development+of+a+xenon+07/21/98&byte_count=2040#head)

Abstract: The project objective was to determine the feasibility of the gas proportional scintillator detector (GPSD) technology to sensitively and selectively detect the decay products of the metastable xenon isotopes as a means of treaty verification for the CTBT. During the course of the project, the investigation involved both computer simulations and laboratory measurements with a GPSD. During the fourth quarter the authors have further investigated the dedicated GPSD response to x-rays and conversion electrons from {sup 109}Cd and {sup 57}Co radioactive sources, comparing simulated and experimental results. The response of a customized high pressure GPSC was also simulated to the higher energy conversion electrons from xenon radioisotopes. An alternative hybrid detector system is proposed showing excellent prospects for xenon radioisotope detection.

### **Development of an Archive of Seismic Ground Truth Events Globally in Support of Monitoring Under the CTBT**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Development+of+an+Archive+of+Seismic+Ground+Truth+Events+Globally+in+Support+of+Monitoring+Under+the+CTBT>

Abstract not available on this web site

### **Development to Release of CTBT Knowledge Base Datasets**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Development~20to~20Release~20of~20CTBT~20Knowledge~20Base~20Datasets&type=TEXT&docid=~0342129751~202620~20~2fdsk17wais~2fddata~2fgpo~2f041999~2esd03\\_loc~2egpo~07~01~00&seed\\_words\\_used=+development+to+release+10/20/98&byte\\_count=2620#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Development~20to~20Release~20of~20CTBT~20Knowledge~20Base~20Datasets&type=TEXT&docid=~0342129751~202620~20~2fdsk17wais~2fddata~2fgpo~2f041999~2esd03_loc~2egpo~07~01~00&seed_words_used=+development+to+release+10/20/98&byte_count=2620#head)

Abstract: For the CTBT Knowledge Base to be useful as a tool for improving U.S. monitoring capabilities, the contents of the Knowledge Base must be subjected to a well-defined set of procedures to ensure integrity and relevance of the constituent datasets. This paper proposes a possible set of procedures for datasets that are delivered to Sandia National Laboratories (SNL) for inclusion in the Knowledge Base. The proposed procedures include defining preliminary acceptance criteria, performing verification and validation activities, and subjecting the datasets to approved by domain experts. Preliminary acceptance criteria include receipt of the data, its metadata, and a proposal for its usability for U.S. National Data Center operations. Verification activities establish the correctness and completeness of the data, while validation activities establish the relevance of the data to its proposed use. Results from these activities are presented to domain experts, such as analysts and peers for final approval of the datasets for release to the Knowledge Base. Formats and functionality will vary across datasets, so the procedures proposed herein define an overall plan for establishing integrity and relevance of the dataset. Specific procedures for verification, validation, and approval will be defined for each dataset, or for each type of dataset, as appropriate. Potential dataset sources including Los Alamos National

Laboratories and Lawrence Livermore National Laboratories have contributed significantly to the development of the process.

### **Discrimination Information in Phase Amplitude Thresholds with Application to Western China Regional Data**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Discrimination+Information+in+Phase+Amplitude+Thresholds+With+Application+to+Western+China+Regional+Data>

Abstract not available on this web site

### **Empirical Path Corrections for Regional Phase Amplitudes**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Empirical+Path+Corrections+for+Regional+Phase+Amplitudes>

Abstract not available on this web site

### **Identification of Mine Collapses, Explosions, and Earthquakes Using INSAR: A Preliminary Investigation**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Identification+of+Mine+Collapses,+Explosions,+and+Earthquakes+Using+INSAR:>

+A+Preliminary+Investigation

Abstract not available on this web site

### **Identification Performance of the IMS in the Middle East and North Africa**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Identification+Performance+of+the+IMS+in+the+Middle+East+and+North+Africa>

Abstract not available on this web site

### **Improving Sparse-Network Seismic Location with Bayesian Kriging and Teleseismically Constrained Calibration Events**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Improving+Sparse-Network+Seismic+Location+with+Bayesian+Kriging+and+Teleseismically+Constrained+Calibration+Events>

Abstract not available on this web site

### **Infrasound Records from U.S. Atmospheric Tests**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Infrasound~20records~20from~20U~2eS~2e~20atmospheric~20tests&type=TEXT&docid=~0341171310~203088~20~2fdsk17wais~2fdata~2fgpo~2f092298~2esd07\\_loc~2egpo~07~01~00&seed\\_wor ds\\_used=+PROLIFERATION+++01/01/1998&byte\\_count=3088#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Infrasound~20records~20from~20U~2eS~2e~20atmospheric~20tests&type=TEXT&docid=~0341171310~203088~20~2fdsk17wais~2fdata~2fgpo~2f092298~2esd07_loc~2egpo~07~01~00&seed_wor ds_used=+PROLIFERATION+++01/01/1998&byte_count=3088#head)

Abstract: The United States conducted over 100 atmospheric nuclear tests at the Nevada Test Site from 1951 through 1962. Some of the earliest tests caused unexpected damage, primarily broken glass and cracked plaster, in Las Vegas and other surrounding communities. To address this problem, Sandia initiated a program to monitor and predict the pressure waves around NTS. Infrasound recording systems were developed, then field for all tests beginning with Operation Buster in October 1951. Investigators soon discovered that near- surface temperature inversions and wind profiles caused the damaging pressures in Las Vegas. A typical test was recorded at about a dozen stations from the Control Point on NTS to as far away as Pasadena, CA. In addition, some tests in the South Pacific were monitored, as well as numerous chemical explosions. Strip charts recorded signals in the frequency band from 0.05 to 30 Hz, and the paper tapes were achieved at Sandia in the early 1970s. The NTS events ranged in yield from below 1 ton to 74 kilotons; source altitudes varied from near ground level (including some cratering experiments) to as high as 11 km. The resulting data contain a wealth of information on the source function, yield scaling and regional propagation of infrasound signals from atmospheric explosions. The renewed interest in infrasonic monitoring for CTBT verification has prompted the authors to exhume some of the archived records. The authors plan to digitize the signals from several tests and evaluate their applicability to CTBT issues. In addition, they will collect any existing parametric measurements for these records (arrival times, amplitudes, etc.). All data will be converted to CSS database format and made available to the research community. If appropriate, the resulting information could also be included in the Knowledge Base under development for CTBT monitoring.

## **Infrasound Workshop for CTBT Monitoring: Proceedings**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Infrasound~20workshop~20for~20CTBT~20monitoring~3a~20Proceedings&type=TEXT&docid=~0341585548~202748~20~2fdsk17wais~2fddata~2fgpo~2f041999~2esd03\\_loc~2egpo~07~01~00&seed\\_words\\_used=+PROLIFERATION+++01/01/1998&byte\\_count=2748#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Infrasound~20workshop~20for~20CTBT~20monitoring~3a~20Proceedings&type=TEXT&docid=~0341585548~202748~20~2fdsk17wais~2fddata~2fgpo~2f041999~2esd03_loc~2egpo~07~01~00&seed_words_used=+PROLIFERATION+++01/01/1998&byte_count=2748#head)

Abstract: It is expected that the establishment of new infrasound stations in the global IMS network by the Provisional Technical Secretariat of the CTBTO in Vienna will commence in the middle of 1998. Thus, decisions on the final operational design for IMS infrasound stations will have to be made within the next 12 months. Though many of the basic design problems have been resolved, it is clear that further work needs to be carried out during the coming year to ensure that IMS infrasound stations will operate with maximum capability in accord with the specifications determined during the May 1997 PrepCom Meeting. Some of the papers presented at the Workshop suggest that it may be difficult to design a four-element infrasound array station that will reliably detect and locate infrasound signals at all frequencies in the specified range from 0.02 to 4.0 Hz in all noise environments. Hence, if the basic design of an infrasound array is restricted to four array elements, the final optimized design may be suited only to the detection and location of signals in a more limited pass-band. Several participants have also noted that the reliable discrimination of infrasound signals could be quite difficult if the detection system leads to signal distortion. Thus, it has been emphasized that the detection system should not, if possible, compromise signal fidelity. This report contains the workshop agenda, a list of participants, and abstracts and viewgraphs from each presentation.

## **Mine Seismicity and the Comprehensive Nuclear-Test-Ban Treaty**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Mine+Seismicity+and+the+Comprehensive+Nuclear-Test-Ban+Treaty>

Abstract: This report places emphasis on reducing the ambiguity of the mine signals, as opposed to reducing their visibility. It was indicated that this could be achieved through a combination of improvements in the Comprehensive Nuclear-Test-Ban Treaty (CTBT) monitoring capabilities, and of voluntary measures on the part of the mining industry such as providing data on its large blasts and its seismically ambiguous ground failures. This report also cautioned against advocating changes in mining practices which could be costly to the industry.

## **Mineseis -- a Matlab Gui Program to Calculate Synthetic Seismograms From a Linear, Multi-Shot Blast Source Model**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Mineseis~20~2d~2d~20A~20MATLAB~20GUI~20program~20to~20calculate~20synthetic~20seismograms~20from~20a~20linear~2c~20multi~2dshot~20blast~20source~20model&type=TEXT&docid=~0341566951~202825~20~2fdsk17wais~2fddata~2fgpo~2f041999~2esd03\\_loc~2egpo~07~01~00&seed\\_words\\_used=+mineiseis+a+matlab&byte\\_count=2825#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Mineseis~20~2d~2d~20A~20MATLAB~20GUI~20program~20to~20calculate~20synthetic~20seismograms~20from~20a~20linear~2c~20multi~2dshot~20blast~20source~20model&type=TEXT&docid=~0341566951~202825~20~2fdsk17wais~2fddata~2fgpo~2f041999~2esd03_loc~2egpo~07~01~00&seed_words_used=+mineiseis+a+matlab&byte_count=2825#head)

Abstract: Modeling ground motions from multi-shot, delay-fired mining blasts is important to the understanding of their source characteristics such as spectrum modulation. MineSeis is a

MATLAB{reg\_sign} (a computer language) Graphical User Interface (GUI) program developed for the effective modeling of these multi-shot mining explosions. The program provides a convenient and interactive tool for modeling studies. Multi-shot, delay-fired mining blasts are modeled as the time-delayed linear superposition of identical single shot sources in the program. These single shots are in turn modeled as the combination of an isotropic explosion source and a spall source. Mueller and Murphy's (1971) model for underground nuclear explosions is used as the explosion source model. A modification of Anandakrishnan et al.'s (1997) spall model is developed as the spall source model. Delays both due to the delay-firing and due to the single-shot location differences are taken into account in calculating the time delays of the superposition. Both synthetic and observed single-shot seismograms can be used to construct the superpositions. The program uses MATLAB GUI for input and output to facilitate user interaction with the program. With user provided source and path parameters, the program calculates and displays the source time functions, the single shot synthetic seismograms and the superimposed synthetic seismograms. In addition, the program provides tools so that the user can manipulate the results, such as filtering, zooming and creating hard copies.

### **Mineseis -- a Matlab{reg\_sign} Gui Program to Calculate Synthetic Seismograms from a Linear, Multi-shot Blast Source Model**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=MineSeis~20~2d~2d~20A~20MATLAB~7breg\\_sign~7d~20GUI~20program~20to~20calculate~20synthetic~20seismograms~20from~20a~20linear~2c~20multi~2dshot~20blast~20source~20model&type=TEXT&docid=~033792960~202552~20~2fdsk17wais~2fddata~2fgpo~2f031899~2esd02\\_loc~2egpo~07~01~00&seedwords\\_used=~+mineseis+a+matlab&byte\\_count=2552#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=MineSeis~20~2d~2d~20A~20MATLAB~7breg_sign~7d~20GUI~20program~20to~20calculate~20synthetic~20seismograms~20from~20a~20linear~2c~20multi~2dshot~20blast~20source~20model&type=TEXT&docid=~033792960~202552~20~2fdsk17wais~2fddata~2fgpo~2f031899~2esd02_loc~2egpo~07~01~00&seedwords_used=~+mineseis+a+matlab&byte_count=2552#head)

Abstract: Large scale (up to 5 kt) chemical blasts are routinely conducted by mining and quarry industries around the world to remove, overburden or to fragment rocks. Because of their ability to trigger the future International Monitoring System (IMS) of the Comprehensive Test Ban Treaty (CTBT), these blasts are monitored and studied by verification seismologists for the purpose of discriminating them from possible clandestine nuclear tests. One important component of these studies is the modeling of ground motions from these blasts with theoretical and empirical source models. The modeling exercises provide physical bases to regional discriminants and help to explain the observed signal characteristics. The program MineSeis has been developed to implement the synthetic seismogram modeling of multi-shot blast sources with the linear superposition of single shot sources. Single shot sources used in the modeling are the spherical explosion plus spall model mentioned here. Mueller and Murphy's (1971) model is used as the spherical explosion model. A modification of Anandakrishnan et al.'s (1997) spall model is developed for the spall component. The program is implemented with the MATLAB {reg\_sign} Graphical User Interface (GUI), providing the user with easy, interactive control of the calculation.

### **Modeling Seismic Propagation Effects from Large-Scale Structural Features in Western China**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Modeling+Seismic+Propagation+Effects+from+Large-Scale+Structural+Features+in+Western+China>

Abstract not available from this web site.

### **Nonstationary Bayesian Kriging: A Predictive Technique to Generate Spatial Corrections for Seismic Detection, Location and Identification**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Nonstationary+Bayesian+Kriging:+A+Predictive+Technique+to+Generate+Spatial+Corrections+for+Seismic+Detection,+Location+and+Identification>

Abstract not available from this web site.

### **Nuclear Export Controls and the CTBT: Where We've Been and Challenges Ahead -- Views of an Engineer**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Nuclear~20export~20controls~20and~20the~20CTBT~3a~20Where~20we~27ve~20been~20and~20challenges~20ahead~20~2d~2d~20Views~20of~20an~20engineer&type=TEXT&docid=~0342470802~201750~20~2fdsk17wais~2fddata~2fgpo~2f021599~2esd01\\_loc~2egpo~07~01~00&seed\\_words\\_used=~nuclear+export+control&byte\\_count=1750#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Nuclear~20export~20controls~20and~20the~20CTBT~3a~20Where~20we~27ve~20been~20and~20challenges~20ahead~20~2d~2d~20Views~20of~20an~20engineer&type=TEXT&docid=~0342470802~201750~20~2fdsk17wais~2fddata~2fgpo~2f021599~2esd01_loc~2egpo~07~01~00&seed_words_used=~nuclear+export+control&byte_count=1750#head)

Abstract: The paper discusses the following topics: the importance of export controls; the uniqueness of nuclear weapons and their export control requirements; ``dual-use" controls; and recent developments in nonproliferation beyond export control. Also discussed are some non-obvious challenges which include computer modeling and visualization, and fissile material availability and instant nukes. The author concludes by asking the Nuclear Suppliers Group to consider whether there are ways to make its controls more effective.

### **Path Correction Using Interpolated Amplitude Residuals: An Example from Central China**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Path+Correction+Using+Interpolated+Amplitude+Residuals:+An+Example+From+Central+China>

Abstract: The propagation efficiency of regional seismic phases depends on properties of the lithosphere and can vary dramatically between different source-to-receiver paths in tectonically complex areas [Campillo 1987; Xie et al., 1996]. Well-known path effects include the attenuation or blockage of Lg by oceanic crust and by continental structures such as the edge of the Tibetan Plateau [McNamara et al., 1996; Rapine et al., 1997]. Seismograms recorded at Lanzhou (LZH), China, illustrate both effects (Figure 1). Because regional data (distance less than 2000 km) are all that may be available for small events, we must account for such path effects to monitor for compliance with the Comprehensive Test Ban Treaty (CTBT).

### **Performance of an Island Seismic Station for Recording T-phases**

<http://www.doe.gov:80/cgi-bin/gpogate?headline=Performance~20of~20an~20island~20seismic~20station~20for~20recording~>



[20T~2dphases&type=TEXT&docid=~0344949787~202949~20~2fdsk17wais~2fddata~2fgpo~2f021599~2esd01\\_loc~2egpo~07~01~00&seed\\_words\\_used=+performance+island+seismic+station+recording+hanson,+j.+a.&byte\\_count=2949#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=policy~20issues~20facing~20the~20comprehensive~20test~20ban~20treaty~20and~20prospects~20for~20the~20future&type=text&docid=~0344949787~202949~20~2fdsk17wais~2fddata~2fgpo~2f021599~2esd01_loc~2egpo~07~01~00&seed_words_used=+performance+island+seismic+station+recording+hanson,+j.+a.&byte_count=2949#head)

**Abstract:** As part of the International Monitoring System (IMS) a worldwide hydro acoustic network consisting of 6 hydrophone and 5 island seismic stations has been planned which will monitor for underwater or low altitude atmospheric explosions. Data from this network is to be integrated with other IMS networks monitoring the Comprehensive Nuclear Test-Ban Treaty. The seismic (T-phase) stations are significantly less sensitive than hydrophones to ocean borne acoustic waves. T-phase signal strength at seismic stations depends on the amplitude of the signal in the water column, the hydro acoustic-seismic conversion efficiency, and loss on the seismic portion of the path through the island. In order to understand how these factors influence the performance of T-phase stations seismic and hydro acoustic data are examined from instruments currently deployed on or around Ascension Island in the South Atlantic Ocean. T-phase recordings for the last 3 years have been collected from the GSN seismic station ASCN on Ascension Island. Surrounding the island are 5 hydrophones which are part of the U.S. Air Force Missile Impact Locating System (MILS). Data from this system have been obtained for some of the events observed at ASCN. Four of the hydrophones are located within 30 km of the coast while the fifth instrument is 100 km to the south. Amplitude spectral estimates of the signal-to-noise levels (SNL) are computed and generally peak between 3 and 8 Hz for both the seismometer and hydrophone data. The seismic SNL generally decays to 1 between 10 and 15 Hz while the hydrophone SNL is still large well above 20 Hz. The ratios of the hydrophone- to-seismometer SNL, at their peak in energy, range between 10 and 100 (20-40 dB) unless a hydrophone is partially blocked by the Ascension Island landmass.

### **Policy Issues Facing the Comprehensive Test Ban Treaty and Prospects for the Future**

[Http://www.doe.gov:80/cgi-bin/gpogate?headline=policy~20issues~20facing~20the~20comprehensive~20test~20ban~20treaty~20and~20prospects~20for~20the~20future&type=text&docid=~0341497550~201474~20~2fdsk17wais~2fddata~2fgpo~2f061099~2esd05\\_loc~2egpo~07~01~00&seed\\_words\\_used=+strategic+arms+++01/01/1998&byte\\_count=1474#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=policy~20issues~20facing~20the~20comprehensive~20test~20ban~20treaty~20and~20prospects~20for~20the~20future&type=text&docid=~0341497550~201474~20~2fdsk17wais~2fddata~2fgpo~2f061099~2esd05_loc~2egpo~07~01~00&seed_words_used=+strategic+arms+++01/01/1998&byte_count=1474#head)

**Abstract:** This report is divided into the following 5 sections: (1) Background; (2) Major Issues Facing Ratification of CTBT; (3) Current Status on CTBT Ratification; (4) Status of CTBT Signatories and Ratifiers; and (5) CTBT Activities Not Prohibited. The major issues facing ratification of CTBT discussed here are: impact on CTBT of START II and ABM ratification; impact of India and Pakistan nuclear tests; CTBT entry into force; and establishment of the Comprehensive Nuclear Test-Ban Treaty Organization.

### **Preliminary Definition of Geophysical Regions for the Middle East and North Africa**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Preliminary+Definition+of+Geophysical+Regions+for+the+Middle+East+and+North+Africa>

Abstract not available on this web site

### **Preliminary Regional Seismic Analysis of Nuclear Explosions and Earthquakes in**

## Southwest Asia

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Preliminary+Regional+Seismic+Analysis+of+Nuclear+Explosions+and+Earthquakes+in+Southwest+Asia>

Abstract not available on this web site

## Regional Recordings of the 1997 Kazakstan Depth of Burial Experiment: Observations in Report on the Test and Evaluation of the Chaparral Physics Model 4.1.1 Prototype Microbarograph for CTBT Infrasound Array Application

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Report~20on~20the~20test~20and~20evaluation~20of~20the~20Chaparral~20Physics~20Model~204~2e1~2e1~20prototype~20microbarograph~20for~20CTBT~20infrasound~20array~20application&type=TEXT&docid=~0347396260~201933~20~2fdsk17wais~2fddata~2fgpo~2f061198~2esd04\\_loc~2egpo~07~01~00&seed\\_words\\_used+=report+on+the+test+evaluation+of+the+chaparral+kromer,+r.+p.&byte\\_count=1933#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Report~20on~20the~20test~20and~20evaluation~20of~20the~20Chaparral~20Physics~20Model~204~2e1~2e1~20prototype~20microbarograph~20for~20CTBT~20infrasound~20array~20application&type=TEXT&docid=~0347396260~201933~20~2fdsk17wais~2fddata~2fgpo~2f061198~2esd04_loc~2egpo~07~01~00&seed_words_used+=report+on+the+test+evaluation+of+the+chaparral+kromer,+r.+p.&byte_count=1933#head)

Abstract: The Sandia National Laboratories has tested and evaluated the Chaparral Physics Model 4.1.1 prototype infrasound sensor to CTBT specifications. The sensor was characterized by using a piston-phone chamber to set and measure sensor sensitivity. Multiple sensor side-by-side coherence analysis testing provided a measure of sensor relative gain and phase; sensor self-noise was computed using this technique. The performance of the sensor calibration circuitry was evaluated. Sensor performance was compared to CTBT specifications. The Chaparral sensor met or exceeded all CTBT specifications.

## Seismic-Source Corner Frequencies from the Depth of Burial Experiment

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Seismic-Source+Corner+Frequencies+from+the+Depth+of+Burial+Experiment>

Abstract not available on this web site.

## Seismic Wave Propagation Modeling

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Seismic~20wave~20propagation~20modeling&type=TEXT&docid=~0341547377~202535~20~2fdsk17wais~2fddata~2fgpo~2f041999~2esd03\\_loc~2egpo~07~01~00&seed\\_words\\_used+=PROLIFERATION+++01/01/1998&byte\\_count=2535#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Seismic~20wave~20propagation~20modeling&type=TEXT&docid=~0341547377~202535~20~2fdsk17wais~2fddata~2fgpo~2f041999~2esd03_loc~2egpo~07~01~00&seed_words_used+=PROLIFERATION+++01/01/1998&byte_count=2535#head)

Abstract: This is the final report of a one-year, Laboratory Directed Research and Development (LDRD) project at the Los Alamos National Laboratory (LANL). A hybrid, finite-difference technique was developed for modeling nonlinear soil amplification from three-dimensional, finite-fault radiation patterns for earthquakes in arbitrary earth models. The method was applied to the 17 January 1994 Northridge earthquake. Particle velocities were computed on a plane at 5- km depth, immediately above the causative fault. Time-series of the strike-perpendicular, lateral velocities then were propagated vertically in a soil column typical of the San Fernando Valley. Suitable material models were adapted from a suite used to model ground motions at the US Nevada Test Site. The effects of nonlinearity reduced relative spectral amplitudes by about 40% at frequencies above 1.5 Hz but only by 10% at lower frequencies. Runs made with source-depth

amplitudes increased by a factor of two showed relative amplitudes above 1.5 Hz reduced by a total of 70% above 1.5 Hz and 20% at lower frequencies. Runs made with elastic-plastic material models showed similar behavior to runs made with Masing-Rule models.

### **A Space-Based Radio Frequency Transient Event Classifier**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=A~20space~2dbased~20radio~20frequency~20transient~20event~20classifier&type=TEXT&docid=~0343208784~202412~20~2fdsk17wais~2fddata~2fgpo~2f121098~2esd10\\_loc~2egpo~07~01~00&seed\\_words\\_used=+space-based+radio+moore,+k.+r.&byte\\_count=2412#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=A~20space~2dbased~20radio~20frequency~20transient~20event~20classifier&type=TEXT&docid=~0343208784~202412~20~2fdsk17wais~2fddata~2fgpo~2f121098~2esd10_loc~2egpo~07~01~00&seed_words_used=+space-based+radio+moore,+k.+r.&byte_count=2412#head)

Abstract: The Department of Energy is currently investigating economical and reliable techniques for space-based nuclear weapon treaty verification. Nuclear weapon detonations produce RF transients that are signatures of illegal nuclear weapons tests. However, there are many other sources of RF signals, both natural and man-made. Direct digitization of RF signals requires rates of 300 MSamples per second and produces  $10^{13}$  samples per day of data to analyze. It is impractical to store and downlink all digitized RF data from such a satellite without a prohibitively expensive increase in the number and capacities of ground stations. Reliable and robust data processing and information extraction must be performed onboard the spacecraft in order to reduce downlinked data to a reasonable volume. The FORTE (Fast On-Orbit Recording of Transient Events) satellite records RF transients in space. These transients will be classified onboard the spacecraft with an Event Classifier specialized hardware that performs signal preprocessing and neural network classification. The authors describe the Event Classifier requirements, scientific constraints, design and implementation.

### **Study of Low-Frequency Lg and Other Phases from Explosions Including the Indian Nuclear Test of 11 May 1998**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Study+of+Low-Frequency+Lg+and+Other+Phases+from+Explosions+Including+the+Indian+Nuclear+Test+of+11+May+1998>

Abstract not available on this web site

### **Surface-Wave Calibration Studies for Improved Monitoring of a CTBT**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Surface-Wave+Calibration+Studies+for+Improved+Monitoring+of+a+CTBT>

Abstract not available on this web site

### **Surface Wave Research in the Middle East and North Africa**

<http://www.ctbt.rnd.doe.gov/cgi-bin/bibl.cgi/Surface+Wave+Research+in+the+Middle+East+and+North+Africa>

Abstract not available on this web site.

### **The Use of Propagation Path Corrections to Improve Regional Seismic Event Location in**

## Western China

[http://www.doe.gov:80/cgi-bin/gpogate?headline=The~20use~20of~20propagation~20path~20corrections~20to~20improve~20regional~20seismic~20event~20location~20in~20western~20China&type=TEXT&docid=~0341864582~202852~20~20fdsk17wais~20data~20fgpo~20f051299~20esd04\\_loc~20egpo~07~01~00&seed\\_words\\_used=+use+of+propagation+path+steck,+l.+k.&byte\\_count=2852#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=The~20use~20of~20propagation~20path~20corrections~20to~20improve~20regional~20seismic~20event~20location~20in~20western~20China&type=TEXT&docid=~0341864582~202852~20~20fdsk17wais~20data~20fgpo~20f051299~20esd04_loc~20egpo~07~01~00&seed_words_used=+use+of+propagation+path+steck,+l.+k.&byte_count=2852#head)

**Abstract:** In an effort to improve the ability to locate seismic events in western China using only regional data, the authors have developed empirical propagation path corrections (PPCs) and applied such corrections using both traditional location routines as well as a nonlinear grid search method. Thus far, the authors have concentrated on corrections to observed P arrival times for shallow events using travel-time observations available from the USGS EDRs, the ISC catalogs, their own travel-time picks from regional data, and data from other catalogs. They relocate events with the algorithm of Bratt and Bache (1988) from a region encompassing China. For individual stations having sufficient data, they produce a map of the regional travel-time residuals from all well-located teleseismic events. From these maps, interpolated PPC surfaces have been constructed using both surface fitting under tension and modified Bayesian kriging. The latter method offers the advantage of providing well-behaved interpolants, but requires that the authors have adequate error estimates associated with the travel-time residuals. To improve error estimates for kriging and event location, they separate measurement error from modeling error. The modeling error is defined as the travel-time variance of a particular model as a function of distance, while the measurement error is defined as the picking error associated with each phase. They estimate measurement errors for arrivals from the EDRs based on roundoff or truncation, and use signal-to-noise for the travel-time picks from the waveform data set.

## Strategic Arms Control

### Considerations in Missile Reductions and De-Alerting

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Considerations~20in~20missile~20reductions~20and~20de~20dalerting&type=TEXT&docid=~033791333~201627~20~20fdsk17wais~20data~20fgpo~20f031899~20esd02\\_loc~20egpo~07~01~00&seed\\_words\\_used=+consideration+in+missile+canavan,+g.+h.&byte\\_count=1627#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Considerations~20in~20missile~20reductions~20and~20de~20dalerting&type=TEXT&docid=~033791333~201627~20~20fdsk17wais~20data~20fgpo~20f031899~20esd02_loc~20egpo~07~01~00&seed_words_used=+consideration+in+missile+canavan,+g.+h.&byte_count=1627#head)

**Abstract:** Earlier analyses assumed that all survivable forces could withstand first strikes and retaliate. Only those on alert, at sea, or capable of launching under attack meet that assumption. The sensitivity of those results to non-alert forces is discussed. Reduced alert rates decrease stability indices, primarily by reducing second strikes. Survivable, mobile Russian ICBMs could increase both sides stability. De-alerting hastens expected reductions and raises the possibility of abuse. And the low-force goal of arms reductions has some poorly understood and awkward attributes.

### Issues in National Missile Defense

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Issues~20in~20national~20missile~20defense&type=TEXT&docid=~033765613~201876~20~20fdsk17wais~20data~20fgpo~20f031899~20esd02\\_loc~20egpo~07~01~00&seed\\_words\\_used=+PROLIFERA](http://www.doe.gov:80/cgi-bin/gpogate?headline=Issues~20in~20national~20missile~20defense&type=TEXT&docid=~033765613~201876~20~20fdsk17wais~20data~20fgpo~20f031899~20esd02_loc~20egpo~07~01~00&seed_words_used=+PROLIFERA)

TION+++01/01/1998&byte\_count=1876#head

Strategic missiles and weapons are proliferating rapidly; thus, the US and its Allies are likely to face both capable bilateral threats and multilateral configurations with complex coalitions for which defenses could be essential for stability. Current hit-to-kill interceptor and radar and infrared detection, track, and discrimination technology should suffice for limited threats, but it is necessary to meet those threats in time while maintaining growth potential for the more sophisticated threats likely to follow. National Missile Defense faces a confusing array of threats, programs, and alternatives, but the technologies in development are clearly an appropriate first step towards any of them. They are likely to succeed in the near term; the challenge is to retain flexibility to provide needed options in the mid and long terms.

### **Just What Exactly Is a Warhead? An Analysis of Russian/English Translations and Definitions**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Just~20what~20exactly~20is~20a~20warhead~3f~20An~20analysis~20of~20Russian~2fEnglish~20translations~20and~20definitions&type=TEXT&docid=~0345243518~202095~20~2fdsk17wais~2fdat a~2fgpo~2f121098~2esd10\\_loc~2egpo~07~01~00&seed\\_words\\_used=+just+what+is+in+a+warhead+hadley,+A.&byte\\_count=2095#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Just~20what~20exactly~20is~20a~20warhead~3f~20An~20analysis~20of~20Russian~2fEnglish~20translations~20and~20definitions&type=TEXT&docid=~0345243518~202095~20~2fdsk17wais~2fdat a~2fgpo~2f121098~2esd10_loc~2egpo~07~01~00&seed_words_used=+just+what+is+in+a+warhead+hadley,+A.&byte_count=2095#head)

Abstract: That there are significant definitional differences between languages is a statement of the obvious. It logically follows that definitional ambiguity occurs when translating a term from one language to another. The far-reaching implications of this fact, however, are not as widely recognized. One word that has been and will continue to be significant is warhead. This analysis (1) examines the different translations and definitions of the word warhead in English and Russian; (2) discusses the usage of warhead in the context of arms control; and (3) explores the implications definitional differences have for future negotiations. It specifically utilizes treaty texts, as well as the Helsinki agreement text, to construct a contextual use of warhead. It is concluded that if US policymakers are committed to including nuclear explosive devices in START III force reductions, negotiators must identify and use a more specific term than warhead or boyegolovka. Also included as an appendix are copies of the signed Helsinki agreement in both English and Russian.

### **Stockpile Management Program Quarterly Report, 1998**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Stockpile~20Management~20Program~20quarterly~20report~2e~202~2e~20quarter~201998&type=TEXT&docid=~033819240~201866~20~2fdsk17wais~2fdat~2fgpo~2f031899~2esd02\\_loc~2egpo~07~01~00&seed\\_words\\_used=+NUCLEAR+WEAPONS+++01/01/1998&byte\\_count=1866#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Stockpile~20Management~20Program~20quarterly~20report~2e~202~2e~20quarter~201998&type=TEXT&docid=~033819240~201866~20~2fdsk17wais~2fdat~2fgpo~2f031899~2esd02_loc~2egpo~07~01~00&seed_words_used=+NUCLEAR+WEAPONS+++01/01/1998&byte_count=1866#head)

Abstract: The objective of this program is to ensure the safety and reliability of the enduring nuclear weapons stockpile by: (1) maintaining robust nuclear facilities that comprise the infrastructure needed to conduct the various laboratory programs; (2) maintaining capabilities and qualified personnel needed to successfully implement the Program and ensure availability of competencies; (3) meeting present and future production and surveillance requirements to support the enduring stockpile and other programmatic deliverables; and (4) capturing and maintaining expertise and competency in the processes and technologies required

to build a complete physics package. Summaries of accomplishments are presented for approximately 30 projects managed under this program.

## **Other Arms Control Issues**

### **Freezing the Fighting: Military Disengagement on the Siachen Glacier**

[http://apollo.osti.gov/cgi-bin/gpogate/192.107.175.23=apollo=210=/dsk17wais/indexes/gpo?maxhits=&search\\_term=&f.a=&f.u=&f.b=conventional+warfare&f.v=&f.d=&f.w=&f.k=%3E%3D01%2F01%2F1998&f.x=](http://apollo.osti.gov/cgi-bin/gpogate/192.107.175.23=apollo=210=/dsk17wais/indexes/gpo?maxhits=&search_term=&f.a=&f.u=&f.b=conventional+warfare&f.v=&f.d=&f.w=&f.k=%3E%3D01%2F01%2F1998&f.x=)

Abstract: Since 1984, India and Pakistan have confronted each other militarily for control over the Siachen Glacier and its approaches in the eastern Karakoram mountain range, adjacent to the borders of India, Pakistan, and China. The longest-running armed conflict between two regular armies in the twentieth century, the conflict in Siachen has resulted in hundreds of casualties, mainly because of adverse climatic conditions and harsh terrain. The economic cost of sustaining a conflict in that geographically remote and climatically inhospitable region has also been extremely high for both countries. Past efforts by India and Pakistan to find a mutually acceptable solution have failed, mainly because of mutual distrust and suspicion. This paper examines Indian and Pakistani perceptions, preference, and policies, and identifies options for resolving the conflict. This paper also identifies the most appropriate verification and monitoring technologies to assist policy-makers in ensuring agreement stability and compliance. While a future agreement on resolving the dispute will depend, above all, on the political will of the Indian and Pakistani leadership, adequate, appropriate verification and monitoring mechanism will enhance their ability to reach a sustainable and durable accord of the Siachen conflict.

### **Movements of People, Ideas, Trade, and Technology: Toward a Peaceful Coexistence of India and Pakistan**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=Movements~20of~20people~2c~20ideas~2c~20trade~2c~20and~20technology~3a~20Toward~20a~20peaceful~20coexistence~20of~20India~20and~20Pakistan&type=TEXT&docid=~033521615~202190~20~2fdsk17wais~2fdata~2fgpo~2f061198~2esd05\\_loc~2egpo~07~01~00&seed\\_words\\_used=+movements+of+people,+ideas,++ahmed,+s.&byte\\_count=2190#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=Movements~20of~20people~2c~20ideas~2c~20trade~2c~20and~20technology~3a~20Toward~20a~20peaceful~20coexistence~20of~20India~20and~20Pakistan&type=TEXT&docid=~033521615~202190~20~2fdsk17wais~2fdata~2fgpo~2f061198~2esd05_loc~2egpo~07~01~00&seed_words_used=+movements+of+people,+ideas,++ahmed,+s.&byte_count=2190#head)

Abstract: The potential exists for peaceful and constructive bilateral relations between India and Pakistan. Domestic developments in both countries, the changing global economic and political environment, and structural changes in regional trading patterns have created new opportunities for replacing traditional Indian and Pakistani perceptions of hostility and suspicion with mutual understanding and trust. This substitution process can be accelerated by increasing people-to-people contact, the free flow of information, and economic and technological cooperation between the two neighbors. Nonmilitary confidence building measures could create conditions for an incremental reduction on tensions between India and Pakistan. A popular consciousness for enhanced bilateral cooperation is growing. This process could be strengthened by identifying and exploring new areas of mutually beneficial cooperation that could pave the way for peace.

## **New Horizons and New Strategies in Arms Control**

[http://www.doe.gov:80/cgi-bin/gpogate?headline=New~20Horizons~20and~20New~20Strategies~20in~20Arms~20Control&type=TEXT&docid=~0342408318~202101~20~2fdsk17wais~2fddata~2fgpo~2f051299~2esd04\\_loc~2egpo~07~01~00&see\\_d\\_words\\_used=+new+horizons+new+strategies+in+arms+control&byte\\_count=2101#head](http://www.doe.gov:80/cgi-bin/gpogate?headline=New~20Horizons~20and~20New~20Strategies~20in~20Arms~20Control&type=TEXT&docid=~0342408318~202101~20~2fdsk17wais~2fddata~2fgpo~2f051299~2esd04_loc~2egpo~07~01~00&see_d_words_used=+new+horizons+new+strategies+in+arms+control&byte_count=2101#head)

Abstract: In the last ten years, since the break-up of the Soviet Union, remarkable progress in arms control and disarmament has occurred. The Nuclear Non-Proliferation Treaty (NPT), the completion of the Comprehensive Test Ban Treaty (CTBT), and the Chemical Weapons Treaty (CWC) are indicative of the great strides made in the non- proliferation arena. Simultaneously, the Intermediate Nuclear Forces Treaty (INF), the Conventional Forces Treaty in Europe (CFE), and the Strategic Arms Reduction Treaties (START), all associated with US-Soviet Union (now Russia) relations have assisted in redefining European relations and the security landscape. Finally, it now appears that progress is in the offing in developing enhanced compliance measures for the Biological and Toxin Weapons Convention (BTWC). In sum, all of these achievements have set the stage for the next round of arms control activities, which may lead to a much broader, and perhaps more diffused multilateral agenda. In this new and somewhat unpredictable international setting, arms control and disarmament issues will require solutions that are both more creative and innovative than heretofore.

## **U.S. DEPARTMENT OF STATE**

### **Chemical and Biological**

#### **Iraqi Weapons of Mass Destruction Programs Source**

[http://www.state.gov/www/regions/nea/iraq\\_white\\_paper.html](http://www.state.gov/www/regions/nea/iraq_white_paper.html)

Abstract: "Hard evidence to support claims that it destroyed all of its BW agents and munitions in 1991,? UNSCOM Chairman Richard Butler stated that Iraq's most recent BW declaration, submitted in September 1997, "failed to give a remotely credible account of Iraq's biological weapons program."

### **Conventional Arms Control**

#### **Hidden Killers 1998: The Global Landmine Crisis Source**

[http://www.state.gov/www/global/arms/rpt\\_9809\\_demine\\_nxg.html](http://www.state.gov/www/global/arms/rpt_9809_demine_nxg.html)

Abstract: As we near the end of the 20th century, the indiscriminate use of landmines has become a tragic legacy of civil strife around the world. Landmines impede international efforts to help war-torn countries regain their economic and social infrastructures. Clearing landmines and the debris of war diverts billions of dollars that could otherwise be spent on desperately needed

development projects. In October 1997, at the behest of President Clinton, Secretary of State Madeleine Albright and Secretary of Defense William Cohen announced that the United States would spearhead an international effort to accelerate cooperation and resources for humanitarian demining worldwide to eliminate the threat of landmines to civilians by the year 2010. The Demining 2010 Initiative has now become firmly imbedded in the global humanitarian demining agenda.

### **Implementation of the Helsinki Final Act 4/1/97-3/31/98 Source**

[http://www.state.gov/www/regions/eur/rpt\\_9808\\_oscefin\\_toc.html](http://www.state.gov/www/regions/eur/rpt_9808_oscefin_toc.html)

Abstract: OSCE Report, Implementation of the Helsinki Final Act, April 1, 1997 - March 31, 1998, submitted to Congress on August 12, 1998. Executive Summary and Introduction Principles for Implementation Review of Developments in Implementation, Political Consultative Process Conflict Prevention and Resolution Security European Security Model Forum on Security.

### **The International Traffic in Arms Regulations (22 C.F.R. Parts 120-130)**

<http://www.pmdtc.org/itar2.htm>

Abstract: Section 38 of the Arms Export Control Act (22U.S.C.2778) authorizes the President to control the export and import of defense articles and defense services. The statutory authority of the President to promulgate regulations with respect to export of defense articles and defense services was delegated to the Secretary of State by Executive Order 11958, as amended (42FR4311). This subchapter implements that authority. By virtue of delegations of authority by the Secretary of State, these regulations are primarily administered by the Director of the Office of Defense Trade Controls, Bureau of Political-Military Affairs, Department of State.

### **Nuclear Proliferation**

### **Summit of the Eight: Foreign Ministers' Progress Report Source**

[http://www.state.gov/www/issues/economic/summit/foreign\\_min97.html](http://www.state.gov/www/issues/economic/summit/foreign_min97.html)

Abstract: We are committed to a strategy of global integration aimed at fostering international peace and prosperity. To that end, we have continued to build on the decisions we have already taken and agreed to broaden our common efforts. Since our last meeting in Lyon, we have strengthened our cooperation on nonproliferation, anti-personnel landmine, transnational crime, counter terrorism, and UN reform. This Progress Report highlights our achievements in these areas and decisions for further joint action. We will continue to discuss these issues over the course of the coming year and review them again in Birmingham. In keeping with our strong commitment to advance international peace and security, we discussed a full range of political situations which both complemented and supplemented discussions by the Heads of the Eight.

### **Patterns of Global Terrorism**



<http://www.state.gov/www/global/terrorism/1998Report/1998index.html>

Abstract: The cowardly and deadly bombings of the US Embassies in Kenya and Tanzania in August 1998 were powerful reminders that the threat of international terrorism still confronts the world.

### **U.S. Efforts to Combat International Terrorism**

<http://www.state.gov/www/global/terrorism/970312.html>

Abstract: The picture is mixed, and a clear trend is difficult to discern. Statistics suggest that international terrorism is declining since the number of incidents has dropped from a high of 665 in 1987 to less than 300 in the past year. One explanation for this drop is the end of the Cold War and the sharp decline in revolutionary Marxist terrorism.

### **Nuclear Testing**

#### **OAS: 34 Member States Condemn India/Pakistan Nuclear Testing**

[http://www.state.gov/www/regions/wha/980604\\_oas\\_resolution.html](http://www.state.gov/www/regions/wha/980604_oas_resolution.html)

Abstract: The 28th OAS General Assembly on June 3, 1998 adopted a strong resolution condemning Indian and Pakistani nuclear testing. The U.S. resolution received strong support from OAS member states. Antigua and Barbuda, Brazil, Bolivia, Canada, Costa Rica, Dominican Republic, and Uruguay co-sponsored. The resolution also offers to India and Pakistan the experiences of the hemisphere regarding agreements to guarantee the non-proliferation and banning of nuclear weapons and the mechanisms for implementing them, particularly the Treaty of Tlatelolco and the Brazil-Argentina Agency for Accounting and Control of Nuclear Materials.

### **Regional Arms Control**

Abstract: The Background Notes listed below provide information on geographic entities and international organizations and are updated periodically. Background Notes for some countries are currently unavailable.

#### **Background Information on Countries of the World**

[http://www.state.gov/www/regions/background\\_info\\_countries.html](http://www.state.gov/www/regions/background_info_countries.html)

#### **Background Notes: Africa**

[http://www.state.gov/www/background\\_notes/afbgnhp.html](http://www.state.gov/www/background_notes/afbgnhp.html)

#### **Background Notes: East Asia and the Pacific**

[http://www.state.gov/www/background\\_notes/eapbgnhp.html](http://www.state.gov/www/background_notes/eapbgnhp.html)

## **Background Notes: Europe and the New Independent States of the Former Soviet Union**

[http://www.state.gov/www/background\\_notes/eurbhnhp.html](http://www.state.gov/www/background_notes/eurbhnhp.html)

## **Background Notes: Latin America and the Caribbean**

[http://www.state.gov/www/background\\_notes/arabgnhp.html](http://www.state.gov/www/background_notes/arabgnhp.html)

## **Background Notes: Middle East and North Africa**

[http://www.state.gov/www/background\\_notes/neabgnhp.html](http://www.state.gov/www/background_notes/neabgnhp.html)

## **Background Notes: South Asia**

[http://www.state.gov/www/background\\_notes/sabgnhp.html](http://www.state.gov/www/background_notes/sabgnhp.html)

## **Background Notes: Western Hemisphere**

[http://www.state.gov/www/background\\_notes/whabgnhp.html](http://www.state.gov/www/background_notes/whabgnhp.html)

## **US State Department - Services - Background Notes**

[http://www.state.gov/www/background\\_notes/](http://www.state.gov/www/background_notes/)

## **Strategic Arms Control**

## **Iraqi Weapons of Mass Destruction Programs**

[http://www.state.gov/www/regions/nea/iraq\\_white\\_paper.html](http://www.state.gov/www/regions/nea/iraq_white_paper.html)

Abstract: The Gulf War damaged Saddam Hussein's biological, chemical, ballistic missile, and nuclear weapons programs, collectively referred to as weapons of mass destruction (WMD). The U.N. Special Commission (UNSCOM) was established by the Security Council and accepted by Iraq following the war to eliminate and verify the destruction of Iraq's biological, chemical, and ballistic missile programs. The International Atomic Energy Agency (IAEA) assumed responsibility for dismantling Iraq's nuclear program. Further, the United Nations established sanctions to prevent the purchase of equipment and materials needed to reconstitute Baghdad's WMD programs and inspections to find remaining elements of these programs and deter further research or production related to WMD.

## **Other Arms Control Issues**

### **U.S. State Department - Policy: Political-Military, Arms Control and International Security**

<http://www.state.gov/www/global/arms/>

Abstract: The Office of the Under Secretary for Arms Control and International Security Affairs provides policy direction in the areas of non-proliferation, arms control, regional security and defense relations, and export control policy related to materials that might contribute to proliferation or otherwise harm U.S. interests. The Bureau of Political Military Affairs, which reports to the Under Secretary for Arms Control and International Security Affairs, advises in the development of policies relating to the national security of the United States and in the development of policies arising from U.S. military activities affecting foreign relations.

### **Reorganization Plan and Report**

[http://www.state.gov/www/global/general\\_foreign\\_policy/rpt\\_981230\\_reorg2.html](http://www.state.gov/www/global/general_foreign_policy/rpt_981230_reorg2.html)

Abstract: Arms Control and Disarmament Agency. Effective March 28, 1999, the Arms Control and Disarmament Agency shall be abolished in accordance with the Foreign Affairs Agencies Consolidation Act of 1998 (the "Act"), Subdivision A, Foreign Affairs Reform and Restructuring Act of 1998, as contained in Division G of Pub. Law 105-277.